

# **Service Handbook**

## **HP VISUALIZE B Class and C Class UNIX<sup>®</sup> Workstations**



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## Printing History

New editions of this manual incorporate all material updated since the previous edition. Update packages may be issued between editions and contain replacement and additional pages to be merged into the manual by the user.

The manual part number and printing date indicate its current edition. The manual part number changes when extensive technical changes are incorporated. The printing date changes when a new edition is printed. (Minor corrections and updates which are incorporated at reprint do not cause the date to change.)

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# **1 Product Information**

This chapter introduces the HP VISUALIZE B Class and C Class workstations, including their controls and indicators. This information is provided to help familiarize you with the main features and components of these workstations.

Included in this chapter are the following topics:

- Product description
- System unit front panel controls
- System unit rear panel connectors
- Monitor information
- Keyboard and Mouse information
- Operating System Overview

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## Product Description

The HP VISUALIZE B Class and C Class workstations contain the following key features:

- **Processor:**
  - One 300MHz PA8500 microprocessor in the B1000 workstation
  - One 400MHz PA8500 microprocessor in the C3000 workstation
  - One 550MHz PA8600 microprocessor in the C3600 workstation
  - The PA8500 processor has a 0.5MByte instruction cache and a 1.0MByte data cache
- **Operating System:**

Workstations B Class and C Class require HP-UX 10.20 and Workstation ACE (Additional Core Enhancements) for HP-UX 10.20 (June, 1999) or HP-UX 11.0 ACE 9911.
- **User Interface:**

HP CDE graphical user interface
- **Compatibility:** Source and binary code compatible with the Series 700 product family
- **Monitors:**
  - 19-inch, 1280×1024 and 1600×1200 color, 75Hz
  - 21-inch 1280×1024 (stereo capability) and 1600×1200 color, 75Hz
- **Optional Graphics:**
  - HP VISUALIZE-EG and VISUALIZE fx2 Pro (for B1000)
  - HP VISUALIZE-EG, VISUALIZE fx2 Pro and VISUALIZE fx4 Pro (for C3000)
  - HP VISUALIZE-EG, VISUALIZE fxe (for C3600)
- **Main Memory:**
  - 128MByte and 256MByte DIMMs for B Class and C Class workstations
  - Eight memory slots available per each B Class and C Class workstations
  - Minimum of 128MBytes and a maximum of 2GBytes of memory (B Class and C Class)
- **Internal Storage Devices:**
  - Wide Ultra2 Low-Voltage Differential SCSI – up to two:
    - 9.0 GB Hard Disk Drive
    - 18.0 GB Hard Disk Drive
  - Removable Media (one of each maximum)
    - CD-ROM Drive
    - Floppy Disk Drive

- Standard Network:
  - RJ45, Twisted Pair 10 BaseT/100 BaseT
- Standard I/O Ports:
  - Ultra2 Wide Low-Voltage Differential (LVD) SCSI, one
  - Ultra Narrow Single-Ended (NSE) SCSI, one
  - Parallel port (IEEE 1284), one
  - Universal Serial Bus (USB) ports, two
  - Serial Interface ports (RS-232C), two
  - Audio ports (Line-in, Line-out, headset, and microphone-in)
- Optional I/O:

Six PCI slots are available for the B Class and C Class workstations.

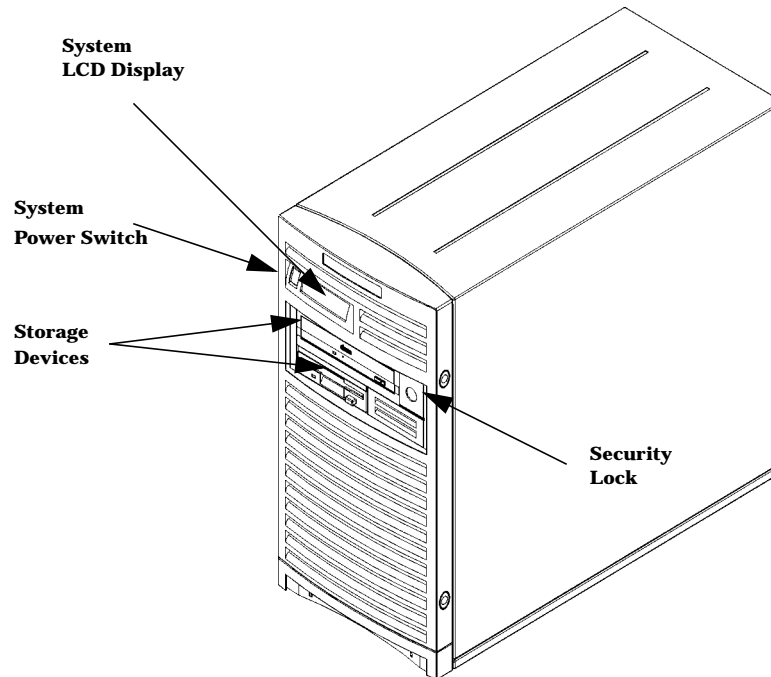
  - 1 PCI 4X:64 bit, 66 MHz, primary graphics (full size, 3.3V)
  - 2 PCI 1X:32 bit, 33 MHz, (half size, 5V)
  - 3 PCI 2X:64 bit, 33 MHz, (full size, 5V)
- Keyboard:
  - Universal Serial Bus (USB) keyboard, one
- Mouse:
  - Universal Serial Bus (USB) mouse, one

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## System Unit Front Panel Controls

Figure 1-1 shows the location of the system unit front panel controls.

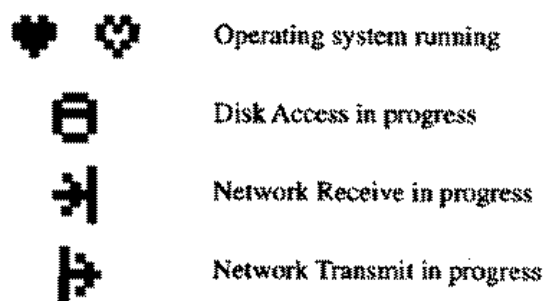
**Figure 1-1. System Unit Front Panel Controls**



### System LCD

The Liquid Crystal Display (LCD) is located on the left side of the front panel. The LCD displays 2-lines of information, with up to 16-characters per line. It displays messages about the state of the system, including error codes. Figure 1-2. on page 22, describes the symbols representing the different system activities. For information about error codes, refer to Chapter 3 , “Troubleshooting,” on page 47.

**Figure 1-2. LCD Symbols**



## System Power Switch

Use the Power switch to power the system unit on and off. When you use the soft power down procedure, the B Class and C Class workstations' hardware is designed to produce the proper diagnostic and self test messages, and broadcasts a warning message to remote terminals that it is about to shutdown. The operating system executes an automatic `shutdown -q` command. Turning the power switch back on again automatically boots up the HP-UX 10.20 operating system and the Workstation Additional Core Enhancements for HP-UX 10.20 (June 1999) or HP-UX 11.0 ACE 9911 if the system has been configured to `auto boot`. For information on setting `auto boot`, refer to the section "Setting the Auto Boot and Auto Search Flags" on page 178.

## Storage Device Controls and Features

This workstation allows either or both of the following internal storage devices: CD drive or floppy disk drive. The following sections describe the controls and features of these devices.

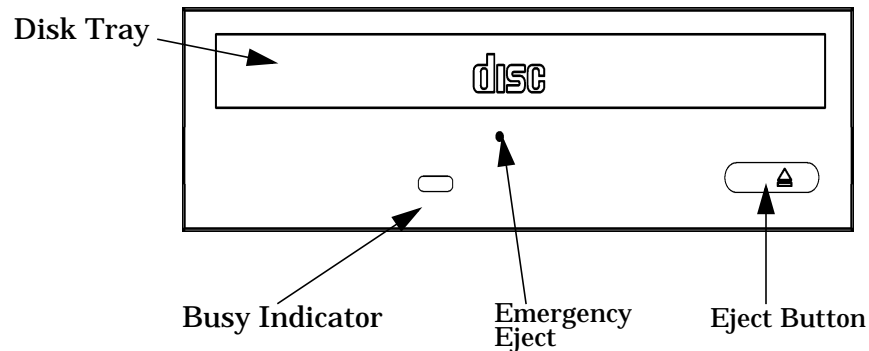
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<b>NOTE</b>	You cannot have two internal storage devices of the same type. For example, you cannot have two floppy disk drives, and you cannot have two CDROMs.
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Figure 1-3. shows the operating controls and features of the CD drive, and Table 1-1. describes those controls and features.

**Figure 1-3. CD Drive**



**Table 1-1. CD Drive Controls**

Control/Feature	Purpose
Eject Button	Press to open the Disc Tray and insert or remove a disc. When the drive is in use, press the eject button for more than one second to open the Disc Tray. Press to close the tray.
Emergency Eject	If the workstation does not have power, you can insert the end of a paper clip into this small hole to open the Disc Tray.
Disk Tray	The Disk Tray holds the CD. This style of CD drive does not use a disk caddy.
Busy Indicator	Lights during a data access operation and blinks during a data transfer. The indicator blinks initially and then stays lit when there is one of the following. <ul style="list-style-type: none"> <li>• A defective disc</li> <li>• A disc insertion error (for example, an upside down disc)</li> <li>• No disc present</li> </ul>

---

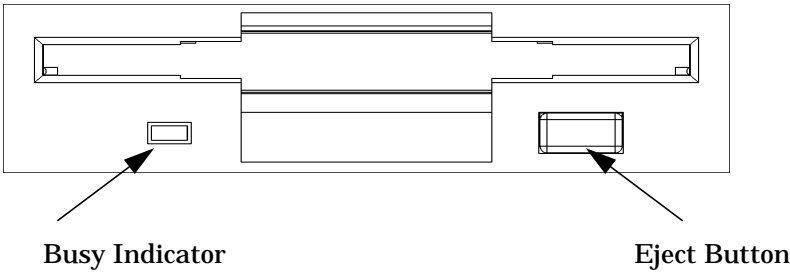
**NOTE** The audio features of the CD drive are supported through applications only. One such application is `xmcd`. The `xmcd` utility is not a part of HP-UX, you will need to download it off the web using your web browser and this URL:  
<http://metalab.unc.edu/tkan/xmcd>

---

The optional floppy disk drive (Product Number A5009A) is a 3.5-inch form factor device with a PC/AT interface. It connects to the workstation via a 34-pin PC/AT ribbon cable and a 4-pin power cable. The floppy disk drive has up to 1.44 MByte capacity depending on the media and format used.

Figure 1-4. shows the operating controls and features of the floppy drive, and Table 1-2. describes those controls and features.

**Figure 1-4. Floppy Drive Controls and Features**



**Table 1-2. Floppy Drive Controls and Features**

Control/Feature	Purpose
Floppy Drive Eject Button	Push the eject button to remove floppy diskettes from the drive.
Floppy Drive Activity LED	The floppy drive LED flashes to indicate the drive is in use.

### Security Lock

Access to the mass storage devices is controlled by a security lock on the front panel. Locking the workstation front panel minimizes potential unauthorized user access.

To prevent access to internal components requires the use of the security loop on the rear panel of the workstation. See “Unit Rear Panel Controls”.



## System Unit Rear Panel Connectors

This section describes the following connectors on the system unit's rear panel:

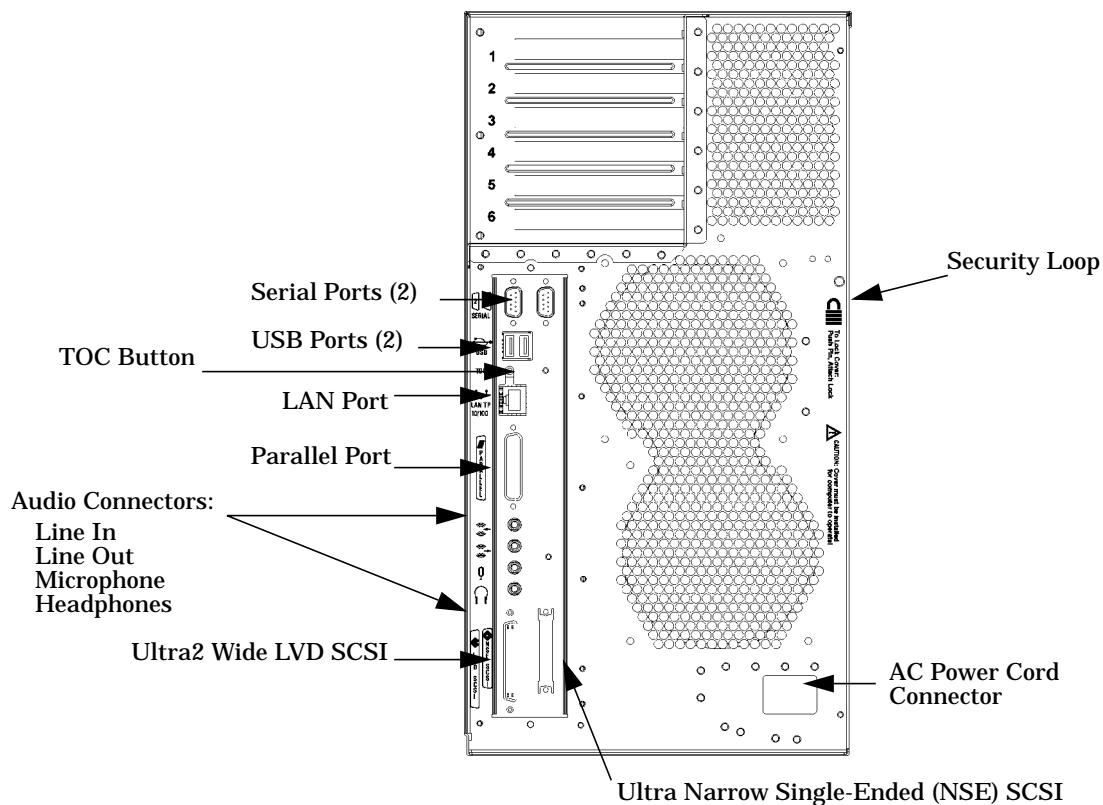
- Two serial ports (RS-232)
- Two Universal Serial Bus ports (USB)
- LAN connector, 10 BaseT/100 BaseT
- HP parallel IEEE 1284 (printer) connector
- Audio connectors (PCI based, line in, line out, headset, and microphone in)
- Ultra2 Wide LVD (Low Voltage Differential) SCSI
- Ultra Narrow Single-Ended (NSE) SCSI
- TOC (transfer of control) button
- AC power cord connector
- Security loop

---

**NOTE** To maintain FCC/EMI compliance, verify that all cables are fully seated and properly fastened.

---

**Figure 1-5. System Unit Rear Panel Connectors**



Audio Connectors

The Model B Class and C Class workstations have audio-input and -output capabilities through external input and output connectors on the rear panel and through an internal speaker. The sound is 16-bit, 44 kHz (CD-quality).

The rear panel contains the Audio IN (Stereo line-in) and Microphone (Mic-in), and Audio OUT (Stereo line-out) and Headphones (headphone-out) connectors. This workstation also has a mono internal speaker.

The audio connectors are standard stereo audio mini-jacks (see Figure 1-6).

NOTE	Hewlett-Packard recommends using gold-plated plugs available through audio retailers for best quality recording and playback through the external connectors.
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Figure 1-6. Audio Connectors

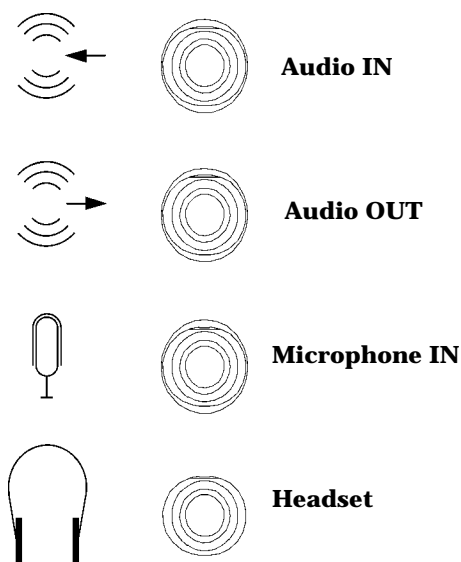


Table 1-3. summarizes the audio electrical specifications for the Model B Class and C Class workstations.

**Table 1-3. Audio Electrical Specifications**

Frequency Response	25 to 20KHz
Input Sensitivity/Impedance	
Line in	2.0V pk/47kohm
Microphone in	22mVpk/1kohm
Max Output Level/Impedance	
Line Out	2.8Vpp/47kohm
Headphone	2.75Vpp/50ohm
Speaker (internal)	5.88Vpp/48ohm
Output Impedance	
Line Out	619ohm
Headphone	118ohm

## USB Connectors

The USB connectors located on the rear panel of the workstation provide an interface for the keyboard and mouse to the system. These USB connectors support only the HP keyboard, scroll mouse and hub. The keyboard and mouse may be plugged into the rear of the workstation or plugged into the USB hub. *No* other USB configuration is currently supported. Consult the documentation that accompanies each input device for specific information concerning its use.

For more information on the Universal Serial Bus, refer to the following URL:

<http://www.usb.org>

---

<b>CAUTION</b>	Usage of devices other than USB specification may result in unpredictable functionality and inferior performance of the B Class and C Class workstations.
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<b>NOTE</b>	The USB clip on the rear of the chassis provides strain relief for the USB cables.
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## HP Parallel I/O Connector

The 25-pin HP Parallel I/O interface uses IEEE 1284 I/O interface protocols to support peripheral devices such as printers and plotters. Consult the documentation that accompanies each peripheral device for specific information concerning its use.

## 802.3 Network Connectors

The B Class and C Class workstations have a built-in Twisted Pair (TP) connector for the

802.3 (ETHERNET) or 10BaseT/100BaseT network. Connections to ThinLAN networks require an external transceiver. The workstation automatically selects the correct network setting.

## RS-232 Serial Input/Output Connectors

There are a variety of peripheral devices that can attach to the RS-232 Serial Input/Output (SIO) ports on this workstation. Refer to the label on the rear of the workstation to locate serial port 1 and serial port 2. Peripheral devices include printers, plotters, modems, and scanners. Consult the documentation that accompanies each peripheral device for specific information concerning its use.

The SIO ports are programmable, allowing functions such as bit rate, character length, parity, and stop bits to be set using the System Administration Manager (SAM) or by selecting a system special device file with the functions already programmed. The SIO Ports are used as interfaces for serial asynchronous devices to the CPU.

Table 1-4. shows the SIO connector pin listings. The serial connectors are 9-pin D-sub connectors. Signal names are those specified in the EIA RS-232 standard.

**Table 1-4. Serial I/O Pins**

Pin No.	Signal	Description
1	DCD	Data Carrier Detect
2	RXD	Receive Data
3	TXD	Transmit Data
4	DTR	Data Terminal Ready
5	GND	Ground
6	DSR	Data Set Ready
7	RTS	Request To Send
8	CTS	Clear To Send
9	RI	Ring Indicator

## SCSI Connectors

The B Class and C Class workstations have built in SCSI connectors for Ultra2 Wide Low-Voltage Differential (LVD) SCSI and Ultra Narrow Single-Ended (NSE) SCSI. Use the SCSI connectors to connect external SCSI devices such as DDS-format tape drives and CD-ROM drives. Consult the documentation that accompanies each SCSI device for specific information concerning its use. Refer to Appendix B, SCSI Connections, for information about connecting SCSI devices to your workstation.

---

<b>NOTE</b>	There must ALWAYS be a terminator at both ends of a SCSI bus. This means one internal terminator and one external terminator.
-------------	---

---

## TOC Button

The TOC (transfer of control) button interrupts the system and transfers control from the default device to an auxiliary device. A transfer of control saves the state of the processor in Processor Internal Memory (PIM) and begins execution of recovery software at a nonzero location specified by a special location in Page Zero called MEM\_TOC. The TOC code is protected by a checksum.

## Power Cord Connector

Plug the workstation's power cord into the power cord connector to provide AC power to the system.

## Security Loop

The security loop provides a means of locking the left side panel with a padlock or other locking device to prevent unauthorized access. To operate the security loop:

1. Inspect left side panel for proper seating in the mainframe chassis.
2. Push in the retractable pin on the spring loaded square fastener.
3. Insert the locking device through the top and bottom holes of the square fastener.
4. Inspect after locking device is in place to assure that the retractable pin is captured in the side panel insert hole.

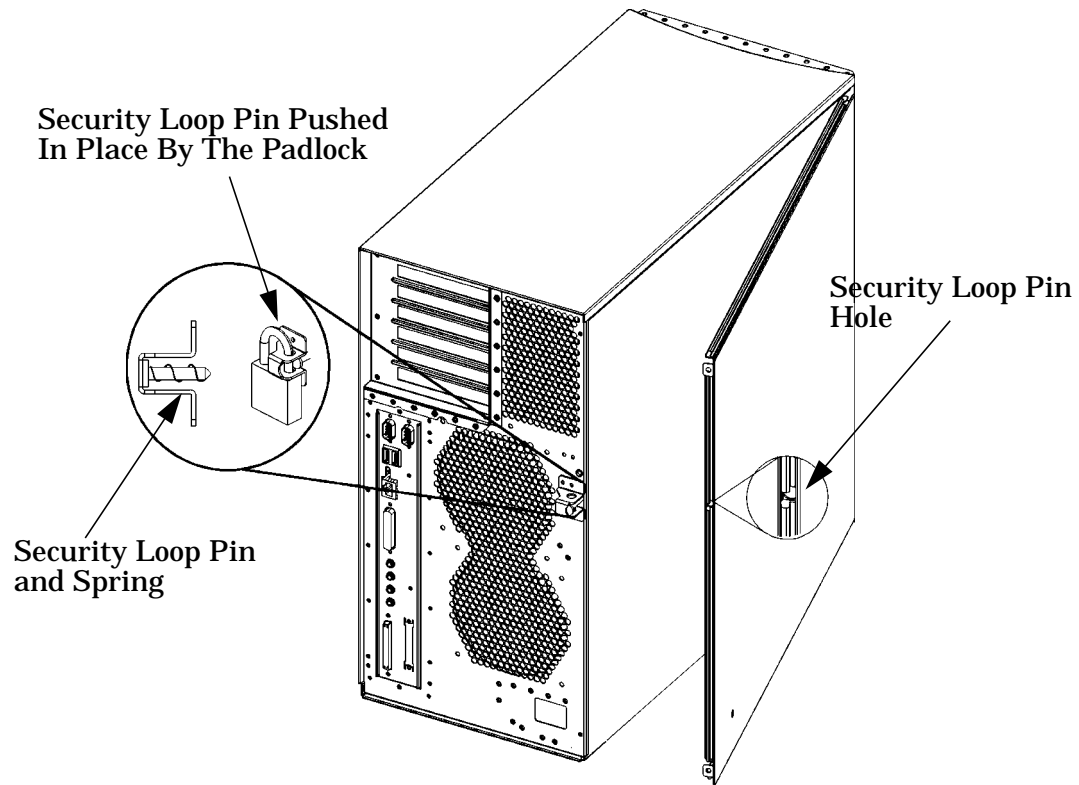
The internal components of the workstation is now secured. See Figure 1-7. on page 30.

---

<b>NOTE</b>	A locking device is not supplied with the workstation; the customer must supply a lock to use with the security loop.
-------------	---

---

**Figure 1-7. Security Loop Operation**



---

## Monitor Information

The B Class and C Class workstations support the following monitors:

- 19-inch, 1600×1200 color monitor (A4575A)
- 21-inch, 1600×1200 color monitor (A4576A)
- 18.1-inch, L1800 Flat Panel Display color monitor (D5065W)

For information on the A4575A monitors, see:

- *HP A4575A Color Monitor CE Handbook* (A4575-90099)

The A4575A is a 19" high-range resolution, multi-mode color monitor for use on workstations and X-terminals. The 19" refers to the tube size. This monitor only has an 18" visible display. This monitor can be used in the Northern and Southern hemispheres. The A4575A and A4576A are substitutes for the A4331A/D and the A4332A. It is a full multi-sync/multi-frequency multi-mode product capable of running in VGA mode with resolutions ranging from 640 480 up to a maximum resolution of 1600×1200 (75Hz).

For information on the A4576A monitor, see:

- *HP A4576A Color Monitor CE Handbook* (A4576-90039)

The A4576A is a 21" high-range resolution, multi-mode color monitor for use on workstations. The 21" refers to the tube size. This monitor only has an 20" visible display. This monitor can be used in the Northern hemisphere. It is a full multi-sync/multi-frequency multi-mode product capable of running in VGA mode with resolutions ranging from 640×480 up to a maximum resolution of 1600×1200 (75Hz).

---

<b>NOTE</b>	Note that the word "multi-sync" is used as a common word to refer to "multi-frequency" and/or "multi-mode." Care should be taken when using "multi-sync" because "MultiSync (TM)" is a registered trademark of NEC.
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<b>NOTE</b>	The connection to earlier HP monitors with 15-pin mini-DSub cables can be made using the A4168A adapter cable shipped with the system miscellaneous kit.
-------------	--

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## HP Supported USB Devices

### USB Keyboard

The HP VISUALIZE B Class and C Class workstations support USB keyboards. The keyboard shipped with the workstation provides a localized PC-104, PC-105 or HP-JIS-106 compatible input device for USB-equipped PA-RISC workstations and other USB-compatible computers that support the HP-UX operating system. The keyboard includes a captive cable terminated in a USB Style A connector.

The USB keyboard is designed specifically for use with HP workstations. All keyboard models with the exception of the JIS-106 layout may also be compatible with conventional personal computers.

Some applications may expect to use keycodes generated by keys existing on other types of keyboards. Consult the documentation that accompanies each input device for specific information concerning its use.

---

<b>NOTE</b>	HIL and PS/2 devices are not supported by the B Class and C Class workstations.
-------------	---

---

### USB HP Scroll Mouse

The HP scroll mouse (USB) has a left and right button that function the same as most mice. However, it also has a scroll wheel located between the two buttons that allows for vertical scrolling in a window. Note that vertical scrolling will only occur if you are in a window's vertical scroll bar. This scroll wheel also functions as a middle button when you press down on it. Essentially, the HP scroll mouse is a three-button mouse.

For general information on the various cursor shapes associated with different areas of HP CDE while using a mouse, see the *Using Your HP Workstation* document.

### HP Hub for USB Devices

The HP USB hub (part number D6804) provides the ability to connect more than one USB device to the workstation, as well as the ability to extend your USB device's cable length. As an example, you may desire to locate the workstation's keyboard and mouse at a greater distance from your workstation. To accomplish this, connect the HP USB hub to one of the USB connectors on the rear of the system. The keyboard and mouse are then plugged into the USB hub. This is the only acceptable USB hub configuration currently supported by Hewlett-Packard.



---

## Operating System Overview

This workstation uses the HP-UX operating system, version 10.20 and the Workstation Additional Core Enhancements for HP-UX 10.20 (June 1999) or HP-UX 11.0 ACE 9911. To verify which version of the operating system you are running, use the following command in a terminal window:

```
system name:$ swlist Enter
```

If you're running HP-UX 10.20, the result from this command will be:

```
# Bundle (s):  
B6193CA B.10.20.ACE.2      Workstation ACE for HP-UX 10.20
```

Instant Ignition systems (systems with preloaded software) have X-Windows, Hewlett-Packard's graphical user interface, and HP CDE installed and configured.

If the Instant Ignition system does not have the kernel preconfigured with all of the device drivers, you need to refer to the manual *Managing Systems and Workgroups* to configure your kernel.

For problems or questions with Instant Ignition, refer to *Using Your HP Workstation* for more information.

Note that both of the documents mentioned in the previous paragraphs can be found at the following Uniform Resource Locator (URL):

```
http://www.docs.hp.com/
```

## Memory

The main memory for an HP VISUALIZE B Class and C Class workstation can vary from a minimum of 128 MBytes to a maximum of 2 GBytes. The workstation has eight memory card slots. Currently the B Class and C Class workstations support only 128 MByte and 256 MByte memory DIMM cards in these slots.

To install DIMM cards in the B Class and C Class workstation reference “Installing Additional Memory” on page 141 in this Service Handbook.

---

**CAUTION** If memory is installed improperly or it is defective the B Class and C Class workstation operating system will *not* boot-up, and a DIMM error will appear in the LCD. If an error does occur, reference Chapter 3, “Troubleshooting” for additional information.

---

## Memory Failures

The HP VISUALIZE B Class and C Class system (with HP-UX 10.20 or HP-UX 11.0 ACE 9911) uses Memory Page Deallocation, a feature that allows the system to provide information to the operating system about memory failures.

You can use the command `memrpt` with the detail switch to obtain information about the Memory Page Deallocation Table (PDT) as well as single bit errors logged by the system.

```
# /usr/sbin/sysdiag Enter
```

```
DUI>logtool Enter
```

```
LOGTOOL>memrpt detail Enter
```

The PDT can also be checked using the `pdt` command in the Service menu of the Boot Console Handler (Refer to Chapter 6). If you replace a defective DIMM, use the Service Menu `pdt clear` command to clear out the PDT.

---

## **2 Configuration**

This chapter provides details about setting up and changing the system configuration for the HP VISUALIZE B Class and C Class workstations.

## Chapter Overview

This chapter contains the following sections:

- Workstation Configurations
- Field Replaceable Unit (FRU) Configurations
  - Internal Storage Devices
  - Memory
  - I/O Cards
  - Monitor-Type Selection

## Workstation Configurations

Refer to the HP Workstations Website for a complete list of supported accessories, peripherals, and operating system versions for the HP VISUALIZE B Class and C Class workstations. The URL for the Website is:

`http://hp.unixworkstations.com`

# FRU Configurations

This section provides information for setting up or changing the configuration of the system Field Replaceable Units (FRUs).

## Internal Storage Configurations

### Hard Disk Drive Configuration

The SCSI IDs for hard disk drives are hard-wired into the SCA Ultra2 Wide LVD SCSI interfaces in the backplane of the two disk bays within the B Class and C Class workstations. Hence, SCSI IDs do not need to be set for the hard disk drives (up to two) installed in these workstations. From top to bottom, the pre-set SCSI IDs for hard disk drives are: 6 and 5.

Similarly, no jumpers are installed at the factory, nor is any jumper installation required at the customer's site, on either of the hard disk drive models that are supported with the B Class and C Class workstations. Both hard disk drive models may be installed into these workstations. See the section titled "Hard Disk Drive" on page 134 for details on installing hard disk drives.

**NOTE** There must ALWAYS be a terminator at both ends of a SCSI bus. This means one internal terminator and one external terminator.

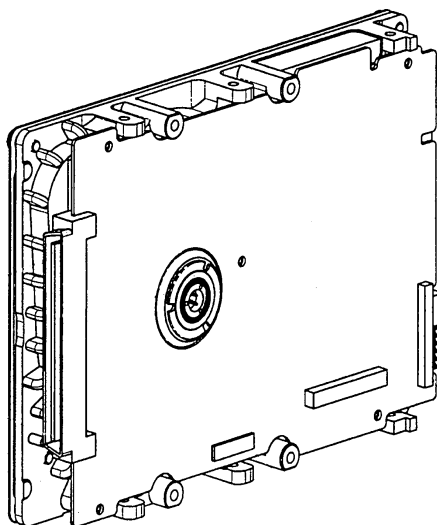
Table 2-1 lists the default device IDs for internal storage devices. These IDs are the default IDs for each storage device. If an existing device already uses an ID, select an alternate ID.

**Table 2-1. Default Device IDs TABLE**

Ultra2 Wide Low-Voltage Differential SCSI	
1st Hard Disk Drive	ID6
2nd Hard Disk Drive	ID5
DDS Drive, external optional device	ID3
** Do not assign SCSI ID7 to any internal storage device.	

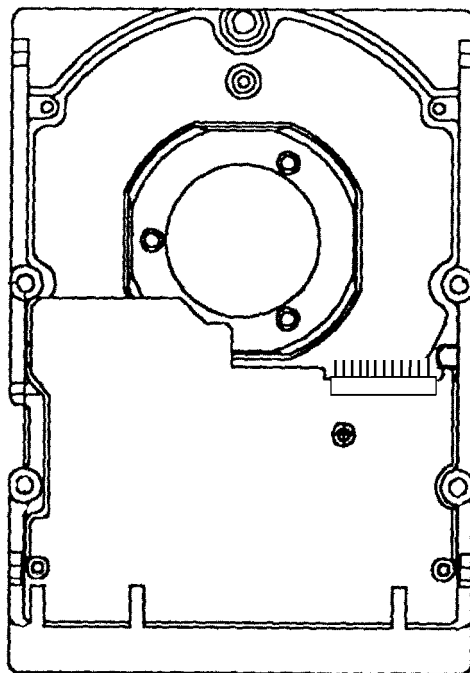
Figures 2-1 and 2-2 show the two types of hard disk drives supported for the B Class and C Class workstation.

**Figure 2-1. Hard Drive, 9Gbyte/18Gbyte Ultra2 Low Voltage Differential**



The hard disk drive in Figure 2-2 is used exclusively for the HP VISUALIZE B Class workstation.

**Figure 2-2. 9Gbyte, 7200 RPM, Hard Disk Drive**



## Configuring a Hard Disk Drive

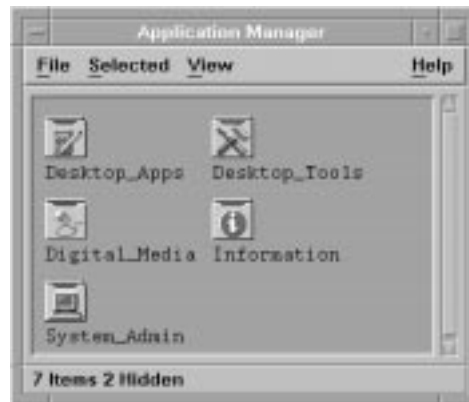
This section describes how to add a hard disk drive to your system as a file system using SAM. For more information about configuring a hard disk drive, refer to the manual *Managing Systems and Workgroups*.

The procedures in this section require you to log in as `root`. If you cannot log in as `root`, contact your system administrator.

1. Log in as `root` and create a mount directory (for example, `/disk1`).
2. Move the mouse pointer to the Application Manager control for tools and click the left mouse button.



3. Click twice on the `System_Admin` icon in the Application Manager window.



4. Click twice on the `Sam` icon in the Application Manager -- `System_Admin` window. If you are `root`, the System Application Manager (SAM) will appear on your screen; otherwise you will be asked to enter the root password and press Enter. The SAM window will appear. You will then need to re-execute steps 1 through 4.



5. Double click on the Disk and File System icon.





6. Double click on the Disk Devices icon.



The following screen message is displayed:

Scanning the system's hardware...

The Disk and File Systems window opens containing a list of drives currently configured on this system. You need to select one of the appropriate drives that is not in use.

7. Click on Add in the Actions menu and select the item Not Using the Logical Volume Manager.
8. Enter the mount directory name in the Mount Directory field of the Add Disk window and click on OK. The following message appears:

Task started.

Creating the device file...

Modifying "/etc/checklist"...

Task completed.

Click OK. You have successfully added a hard disk drive to your system unit.

## CD Drive (Optional) Configuration

The optional CD drive connects to the ATAPI (IDE) interface in the CD drive bay backplane within the B Class and C Class workstations via a 40-pin ribbon cable, a 4-pin audio cable, and a 4-pin power cable. No interfacing addressing is required for the CD drive.

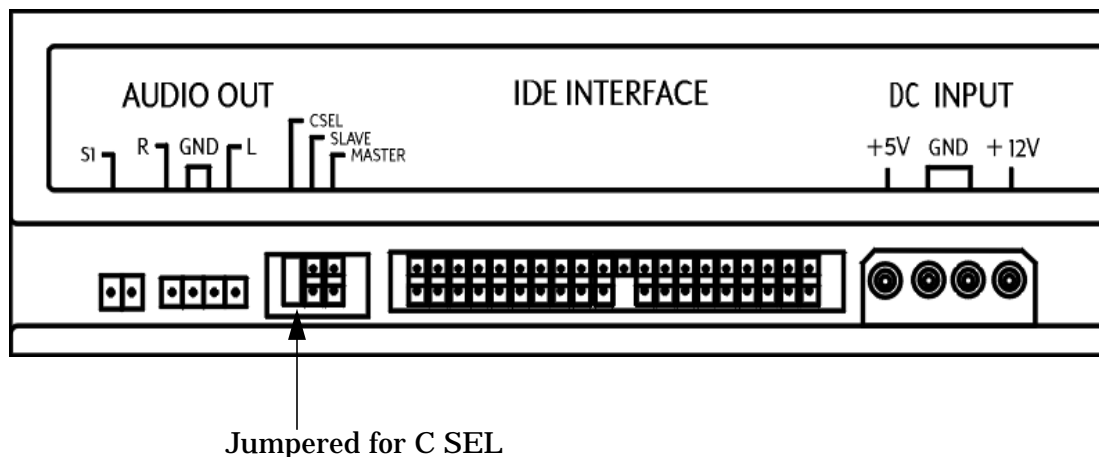
However, as shown in Figure 2-3, the CD drive should have a jumper set on the C SEL (Cable Select) selection pins. (The CD drive should ship from the factory already jumpered for C SEL.)

---

**CAUTION** CD-ROM drives are susceptible to mechanical and electrostatic shock. When handling the drive, always wear the static-grounding wrist strap that came in the CD-ROM drive kit. Always handle the drive carefully.

---

**Figure 2-3. CD Drive Jumper Setting (Rear View)**



See the section titled “Installing a CD Drive” on page 117 for installation details.

## Floppy Disk Drive (Optional) Configuration

The optional 3.5-inch floppy disk drive requires no ID, switch, or jumper settings. See the section titled “Installing a Floppy Disk Drive” on page 125 for installation details.

---

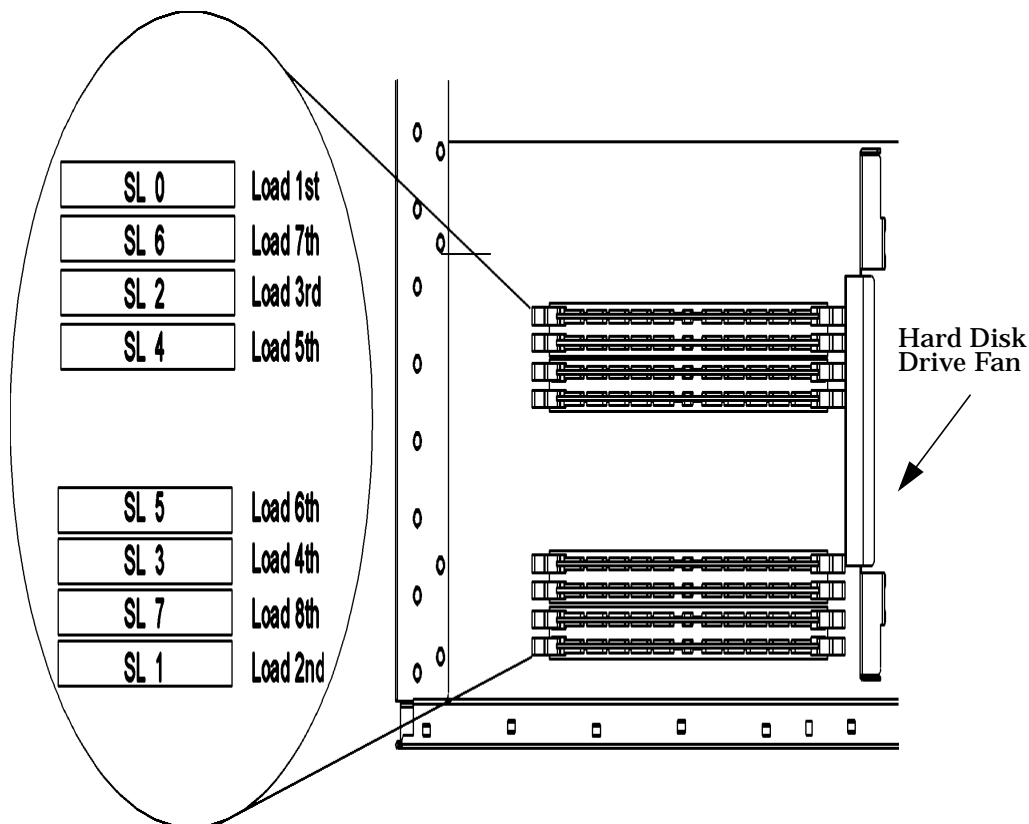
**CAUTION** Floppy disk drives are susceptible to mechanical and electrostatic shock. When handling the drive, always wear the static-grounding wrist strap that came in the floppy disk drive kit. Always handle the drive carefully.

---

## Memory

This workstation has 8 memory slots, labeled 0 through 7. Memory can be configured from 128MB to 1.4GB for the B Class and 256 MB to 2 GB for the C Class. Memory does not have to be configured in pairs for the B Class and C Class, but must be loaded in the order described in Figure 2-4.. Notice the alternating load pattern by location on the system board.

**Figure 2-4. Memory Connectors**




---

**CAUTION** The memory cards must be installed in the correct order, else the system will not boot properly.

---

The B Class and C Class workstation supports the 128 MByte DIMMs or the 256 MByte DIMMs. If users install different size memory boards in a single unit, the largest size must be loaded first then the smaller capacity memory boards for maximum performance. For example, load a 256 MByte DIMM in slot 0 and a 128 MByte DIMM in slot 1.

---

<b>NOTE</b>	Users who wish to achieve both maximum performance and maximum future capacity are advised to use 256 MB boards exclusively.
-------------	--

---

See the section titled “DIMM Cards” on page 141 for details on installing memory. Also, note that there is a label on the floor of the workstation’s interior showing the B Class and C Class memory loading order.

Use the Boot Console Handler to verify that the workstation recognizes the installed memory. See “Displaying the Current Memory Configuration” on page 175 of this manual.

## I/O Cards

There are six I/O slots located on the rear panel of the B Class and C Class workstations. Slots 1 through 4 are full-size PCI slots. Slots 5 and 6 are half-size Peripheral Connect Interface (PCI) slots. See Figure 2-5. for a brief description of slot capabilities.

**Figure 2-5. PCI Card Slot Numbering and Capabilities**

SL1	64 Bit, 5.0V, 33MHz
SL2	Primary Graphics, 64 Bit, 3.3V, 66MHz
SL3	64 Bit, 5.0V, 33 MHz
SL4	Secondary Graphics, 64 Bit, 5.0V, 33 MHz
SL5	32 Bit, 5.0V, 33MHz
SL6	32 Bit, 5.0V, 33MHz

To maintain good graphics performance, you should always use slot 2 (SL2) as your primary graphics card slot and slot 4 (SL4) as your secondary graphics card slot.

---

<b>NOTE</b>	If you connect your monitor to a different graphics card slot, you will need to change the graphics path for that monitor. To do this see the section, “Displaying and Setting the Monitor Type” in Chapter 6, Boot Console Handler in this document.
-------------	---

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See the section titled “I/O Cards” on page 106 for details on installing I/O cards.

## Monitor-Type Selection

The B Class and C Class supports the following monitors:

- 19-inch (18.3-inch viewable) VGA 1600×1200 color monitor (Product Number A4575A)
- 21-inch (19.9-inch viewable) VGA 1600×1200 color monitor (Product Number A4576A)
- 18.1-inch L1800 color flat panel display VGA up to 1280×1024 (Product Number D5065W)
- 19-inch (18-inch viewable) display VGA 1600x1200 (Product Number D8910W)
- 21-inch (19.8-inch viewable) display VGA 1800x1440 (Product Number D2847A)
- 24-inch (22.5-inch viewable) display VGA 1920x1200 (Product Number A1295A)

The monitor type does not have to change since the workstation is set up to support the above mentioned monitors. However, if for some reason the monitor type needs to change, refer to Chapter 6, Boot Console Handler, of this manual.

Note that connection to earlier HP monitors with 15-pin mini-DSub cables can be made using the A4168A adapter cable shipped with your system miscellaneous kit.

---

<b>NOTE</b>	Unsupported monitors may “lock up” if unable to sync to a scan rate provided by the workstation.
-------------	--

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<b>NOTE</b>	The B Class and C Class workstations support a maximum of four VISUALIZE-EG graphics cards with four monitors. One, two, three, or four VISUALIZE-EG graphics cards may be installed per workstation.
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## **3 Troubleshooting**

This chapter provides information about isolating a failing component, known as a Field Replaceable Unit (FRU), in the B Class and C Class workstations.

To troubleshoot a HP VISUALIZE B Class and C Class workstation, you must be familiar with the HP-UX operating system and be able to start and stop processes. You should also be familiar with the boot ROM diagnostics, and the Mesa (Support Tools Manager) on-line tests, which we describe in this chapter.

As a super-user who is troubleshooting a HP-UX system, you should be able to shutdown and reboot a system, start and stop processes, and examine error logs. You should also be able to use systems utilities such as `ioscan` to check device files and configurations, `swlist` to show loaded patches and software bundles, and SAM to configure and show enabled services and configurations. You should also be familiar with STM, the on-line diagnostics tool. You can view a man page on any of these on-line utilities or commands.

Note any error or status messages, then run the power-up boot ROM diagnostics, known as Self Test. If the Self Test diagnostics fail, replace the FRU that is indicated. If the tests pass, but you still suspect a problem, run the ISL diagnostics and Mesa (Support Tools Manager) on-line tests.

For a complete description of using ISL diagnostics and using Mesa (Support Tools Manager), refer to the website URL:

<http://wojo.rose.hp.com/>



---

## Flow Diagrams for Troubleshooting

The following four figures contain troubleshooting flowcharts you can follow to isolate a failing Field Replaceable Unit (FRU). Figure 3-1., “Power On LCD, Troubleshooting Flow,” contains the main troubleshooting flowchart. Figures 3-2 through 3-4 then contain flowcharts for console, bootable device, and HP-UX troubleshooting, respectively.

---

<b>NOTE</b>	For the system to power up, the left side panel must be properly seated in the mainframe chassis to engage the safety interlock switch.
-------------	---

---

**Figure 3-1. Power On LCD, Troubleshooting Flow**

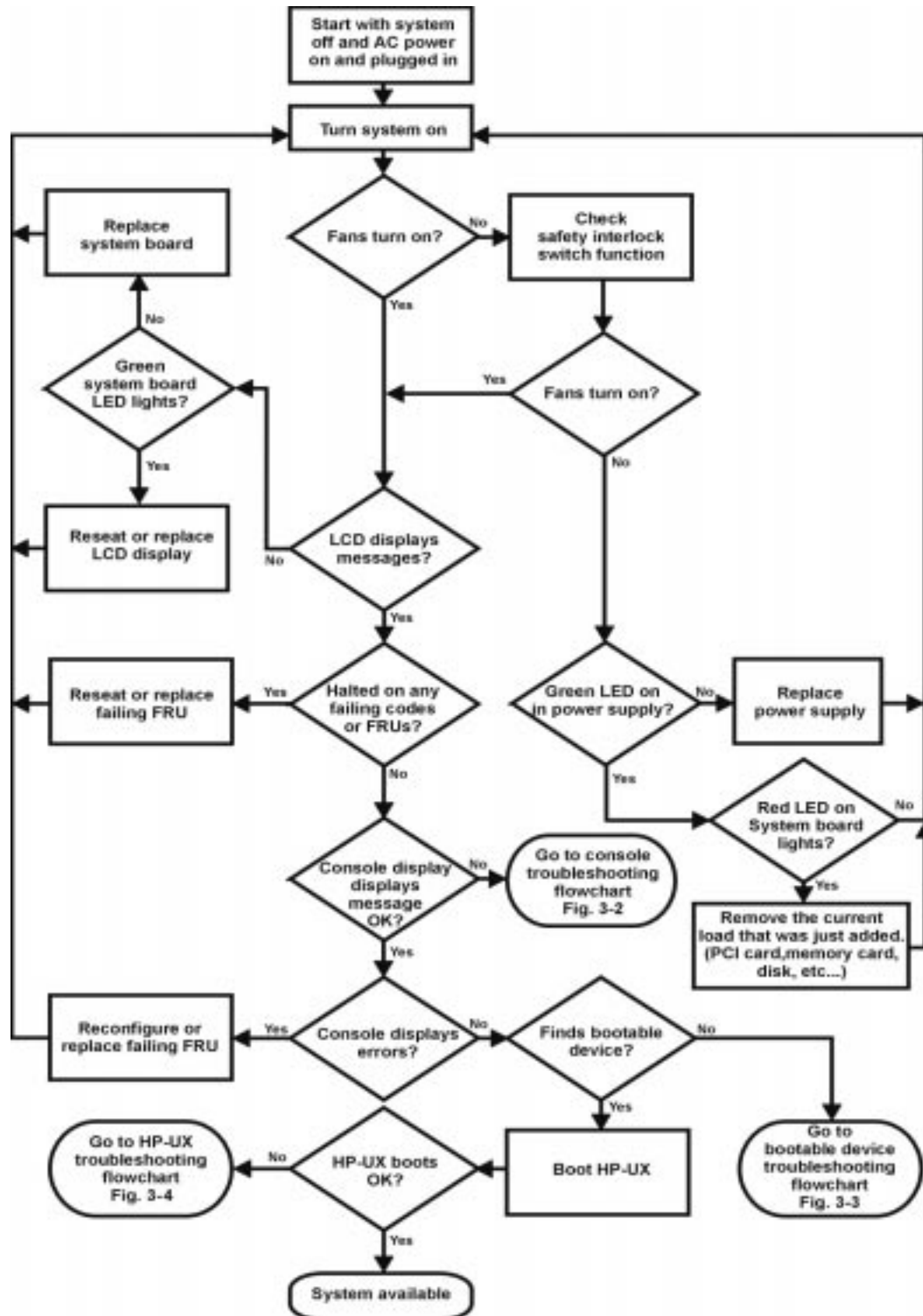
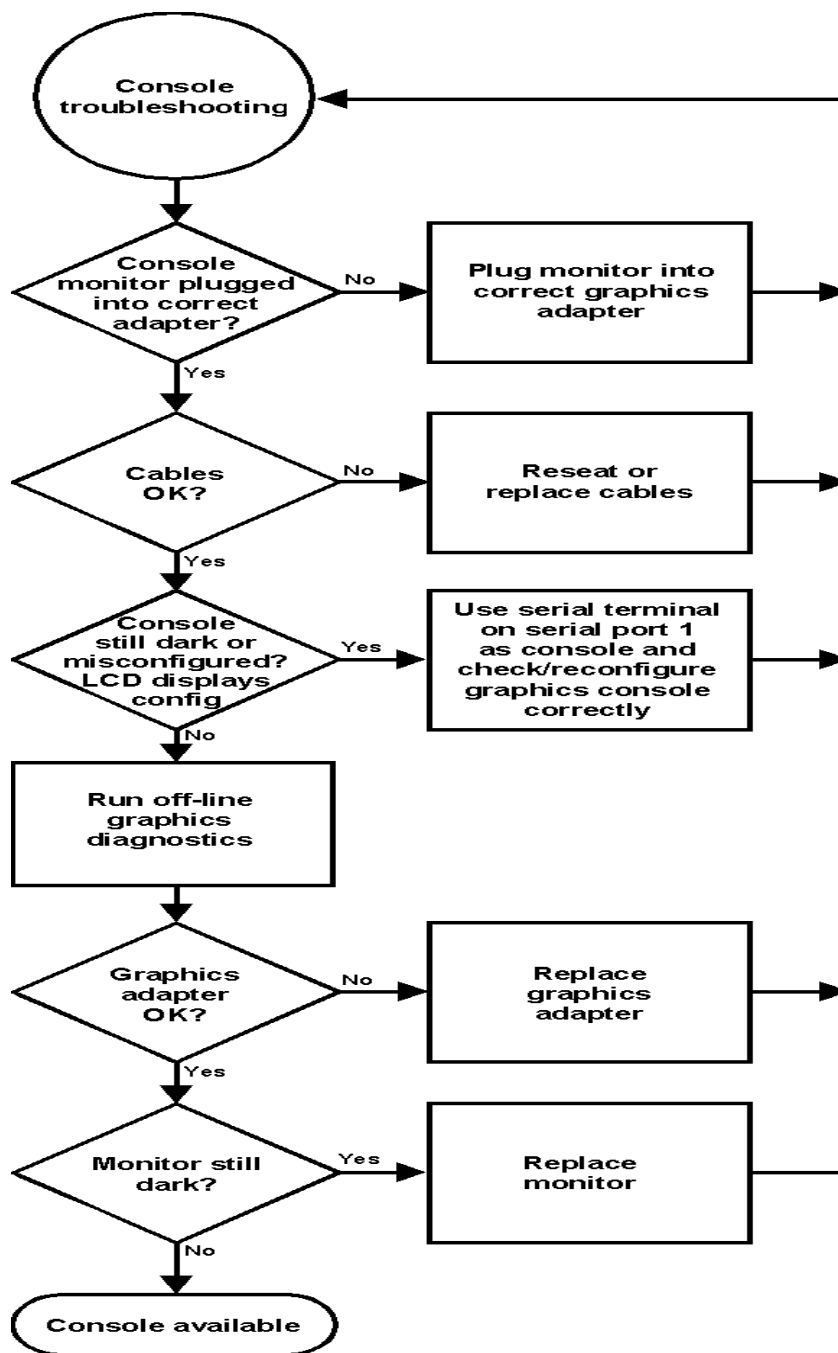
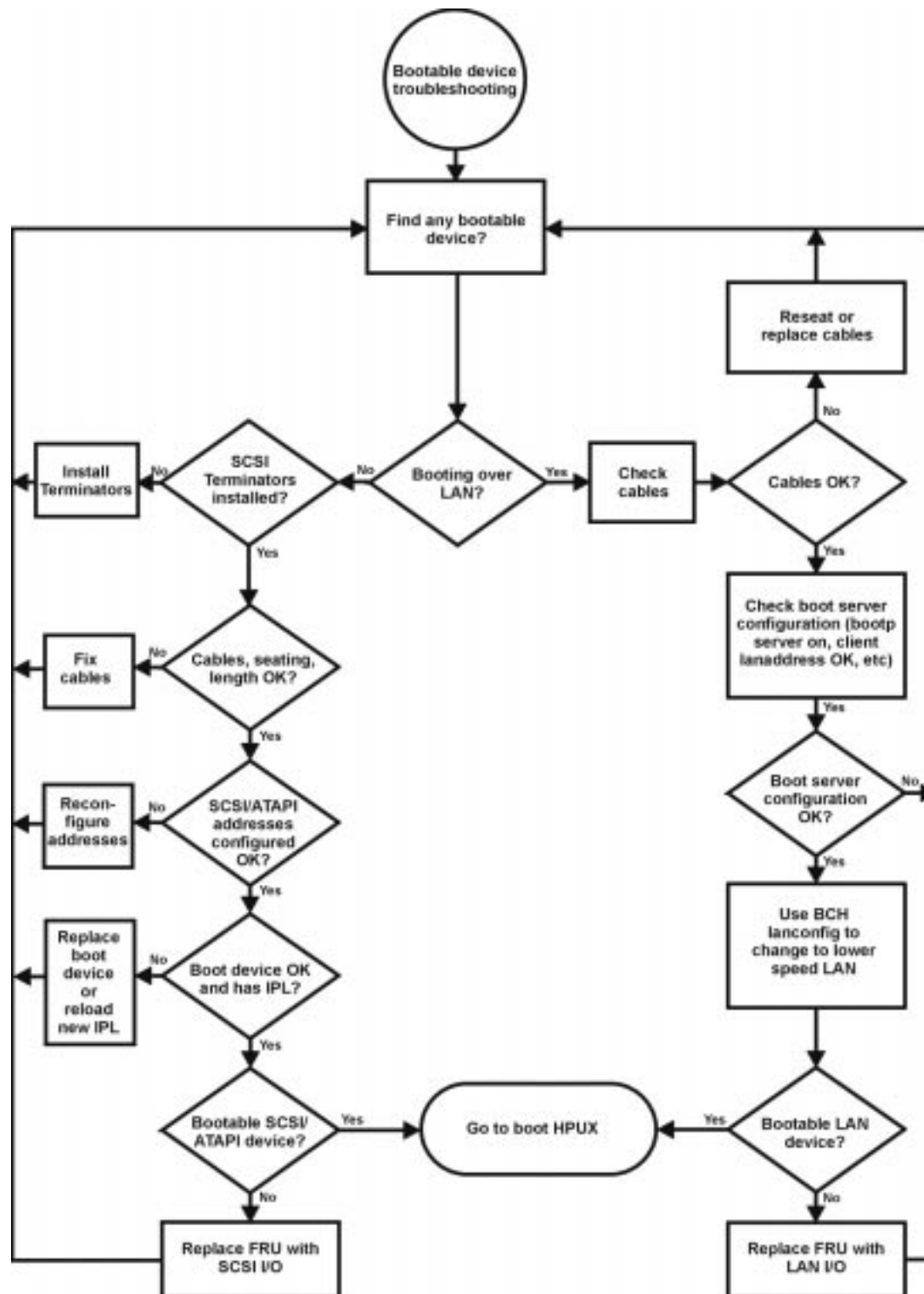


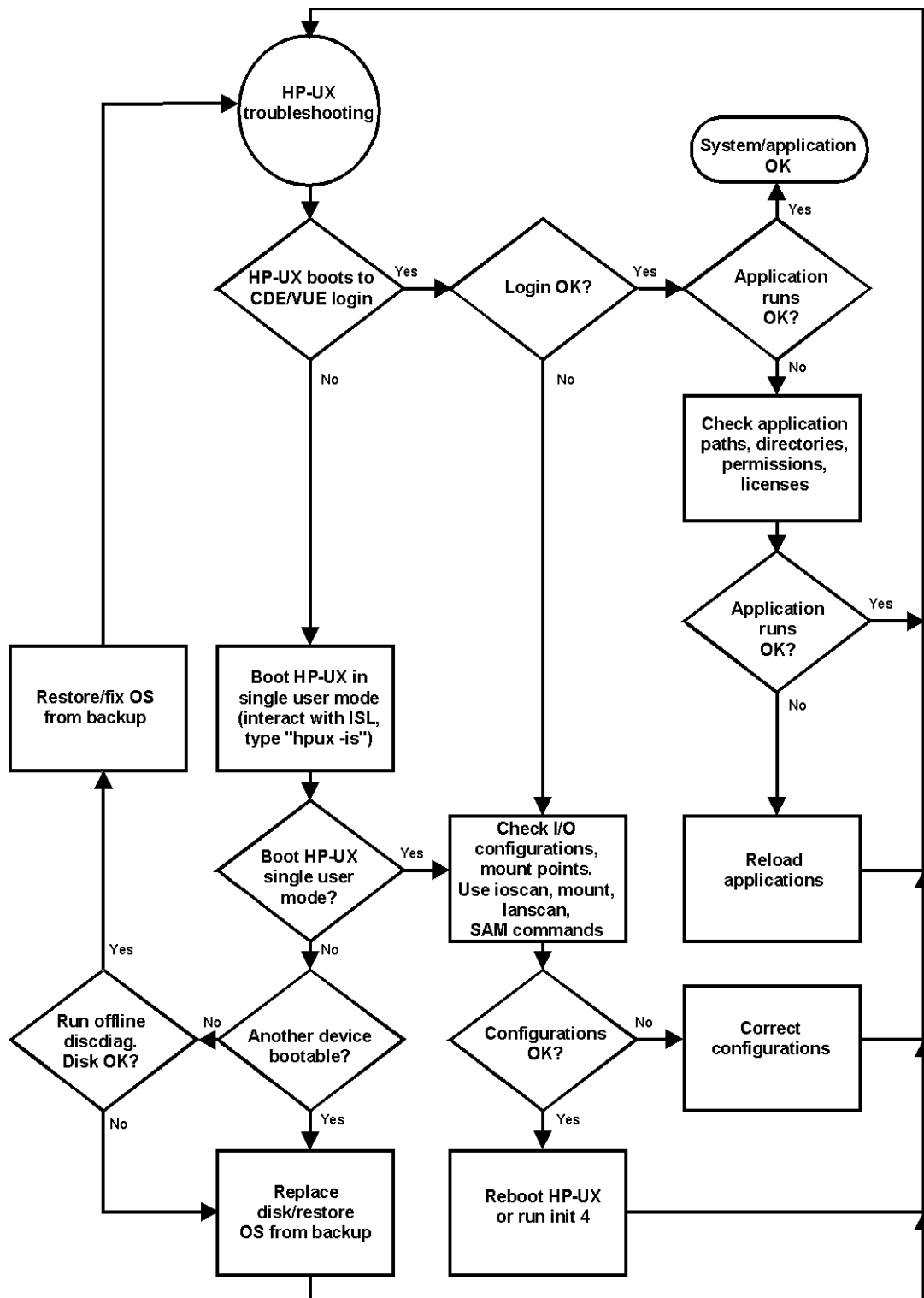
Figure 3-2. Console Troubleshooting Messages



**Figure 3-3. Bootable Device Troubleshooting**



**Figure 3-4. Troubleshooting HP-UX Boot**



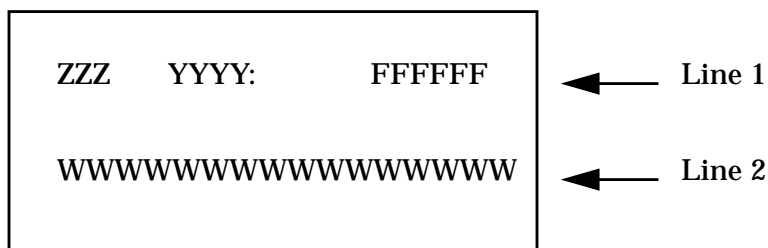
---

## Identifying LCD-Indicated Conditions

This workstation uses an LCD panel to display firmware/OS progress codes. the codes, referred to as chassis codes, consist of one of the mnemonics listed below, followed by a 4-digit hexadecimal number identifying the code module being executed. The mnemonics and their meanings are:

FLT	A hardware error has been detected
TST	Hardware being tested
SHU	System being shutdown
INI	Hardware being initialized
WRN	A non-optimal operating condition exists
RUN	Computer is running operating system

In general, the LCD display has the following format:



ZZZ	Three character chassis code <b>mnemonic</b>
YYYY	Four digit hexadecimal code
FFFFFF	Six character field replaceable unit description
WWWWWWWWWWWWWWWWWW	Description of the chassis code

If the system encounters an **FLT** code while the system is booting, the **FLT** code is interpreted and a message is displayed. For example, you may have information similar to the following in the LCD:

FLT	Three character chassis code <b>mnemonic</b>
30FC	Four digit hexadecimal code
SYS BD	Six character field replaceable unit description
bad sys bd id	Description of the chassis code

## LCD Fan Failures and Warnings

This section provides the failure and warning messages you will see in the LCD if there is a problem with a fan in the B Class and C Class workstation.

A chassis code which indicates that a fan has failed (`FLT D01n`) or is running too slowly (`WRN D02n`) within a B Class or C Class workstation specifies the fan number, *n*. Table 3-1., “Fan Numbers and Corresponding Name,” lists the fan numbers and their names.

**Table 3-1. Fan Numbers and Corresponding Name**

Fan Number	Name of the Fan
1	(not used)
2	Lower System Fan
3	Upper System Fan
4	PCI Card Fan
5	Turbo Cooler Fan, CPU
6	Disk/Memory Fan

Here is an example of a failure message for the I/O (PCI card) fan:

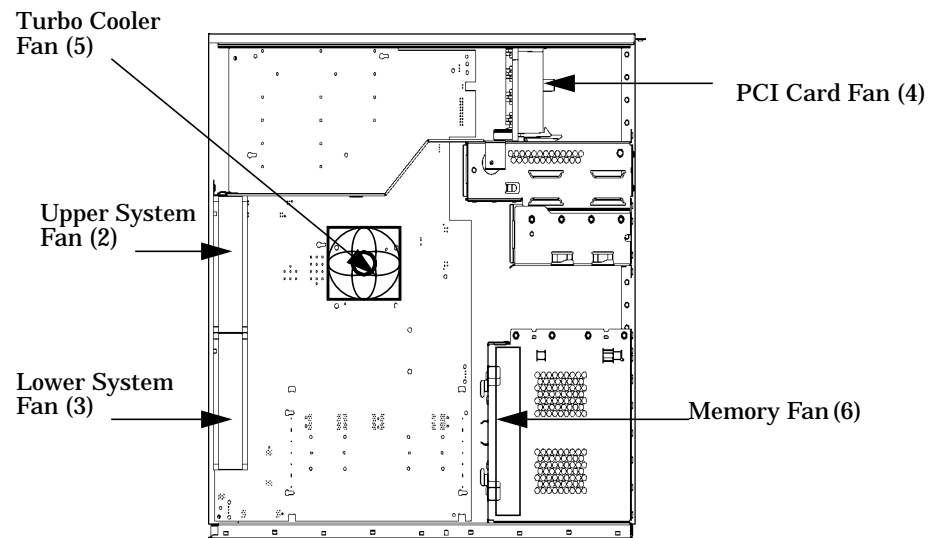
WRN D014 SYS BD
fan 4: failure!

Here is an example of a warning message for the Turbo Cooler Fan, CPU:

WRN D025 SYS BD
fan 5: too slow!

To locate the correct fan, see Figure 3-5.

**Figure 3-5. Fan Locations**



In the case of a fan problem, you will need to replace:

- The fan itself, if it is either a system board cooling fan, PCI (I/O) fan, or a memory fan.
- The entire system board tray assembly, if it is a turbo cooler fan (that is, a fan mounted on a PA-RISC microprocessor on the system board)

See Chapter 4 , “Field Replaceable Units,” for the procedures you should follow to remove and replace these components.



## Dealing with a Boot Failure

To start this workstation from an operating system stored on a device different from the usual boot device, to boot from a different disk, or to boot from another type of device (such as DDS tape drive, an alternate hard disk or CD), see the following situations and examples that use the Boot Console Handler. To access the Boot Console Handler, see Chapter 6 of this manual.

- To boot from a known device containing a bootable operating system, type the following at the prompt and press **Enter**:

Main Menu: Enter a command or a menu > boot *device*

where *device* is the hardware path to the device, specified in Mnemonic Style Notation

For example, to boot an operating system stored on a DDS-format tape in a drive located at "scsi.1.0," go to the Main Menu of the Boot Console Interface and then type the following command at the prompt and press **Enter**:

Main Menu: Enter a command > boot scsi.1.0

The operating system on the specified device is used to start the workstation.

- To interact with the Initial System Loader (ISL) before booting the workstation, type the following at the prompt and press **Enter**:

Main Menu: Enter a command or a menu > boot <device>

You are prompted: Interact with ISL (Y or N) > y

Answering yes (y) causes the ISL to be loaded from the specified device. After a short time, the following prompt appears on the screen:

ISL>

ISL is the program that actually controls the loading of the operating system. By interacting with ISL, you can choose to load an alternate version of the HP-UX operating system.

For example, if the usual kernel (/stand/vmunix for HP-UX 10.20) on the root disk (fwscsi.6.0) has become corrupted, boot the workstation from the backup kernel (/stand/vmunix.prev for HP-UX 10.20) by typing the following at the ISL> prompt and press **Enter**:

ISL> hpux /stand/vmunix.prev

- To find the location of the bootable operating systems on the various media in the file system, use the search ipl command.

## Searching for Bootable Media

To list all devices that may contain bootable media, go to the Main Menu of the Boot Console Interface and then type the following at the prompt:

Main Menu: Enter a command or a menu > search ipl

The search may turn up more devices than there are lines on the display. If using a text terminal, you can control the progress of the search from the terminal's keyboard by performing the following steps:

- To hold the display temporarily, press **Ctrl S**
- To continue the display, press **Ctrl Q**
- To halt the search, press **Esc**

These flow-control commands do not work with a bitmapped display, but such a display can show more than forty lines of text, so they are unnecessary.

To search for devices of just one type that actually contain bootable media, go to the Main Menu of the Boot Console Interface and then type the following at the prompt:

Main Menu: Enter a command > search ipl device\_type

where device\_type is one of the following:

- `fwscsi` is the built-in fast, Ultra2 Wide LVD (Low Voltage Differential) SCSI bus.
- `scsi` is the built-in single-ended SCSI bus.
- `lan` is all connections to the built-in LAN.
- `ide` is the built-in CD-ROM drive.
- `pcin` is an optional SCSI interface in slot number *n*.

## Stable Storage

Stable Storage is non-volatile memory associated with each PA-RISC processor module. Stable storage is used by the processor (CPU) to store device path information, the state of the boot flags, HPMC error information, and operating system initialization data.

## Boot Command Notations

The `boot` command supports the following two notations:

- Mnemonic
- Path number

Type `help scsi` or `help lan` for more information on the boot path parameters.

Here are examples of mnemonic notation:

- `boot` with “no parameters” selects the primary boot path in stable storage.
- `boot` with the `alternate` or `alt` parameters selects the alternate boot path in stable storage.

Here is an example of path number notation:

- `boot p1` [Enter] attempts to boot from the second path in a list generated by a previous search command.

## Supported Boot Paths

SCSI devices are bootable when connected to the SCSI port on the system. Diskless workstations can only boot from the LAN port on the system board. The workstation can be booted from the CD-ROM for software installation.

## ISL Environment

The ISL environment provides the means to load the operating system (HP-UX) environment. The ISL environment also provides an off-line platform to execute diagnostic and utility programs from a boot device when HP-UX does not load.

The ISL program is the first program loaded into main memory from an external media (LAN, disk, or tape) and launched by the initial program loader (IPL) routine during the Boot Administration environment.

The ISL environment provides the following capabilities:

- Execute user-entered commands to modify boot device paths and boot options in stable storage.
- Run off-line diagnostic programs and utilities.
- Provide automatic booting of the HP-UX operating system after power-on or reset.

The ISL program provides a stand-alone environment for loading off-line diagnostic and utility programs from the LIF directory. The ISL program also provides user commands to configure the boot parameters into Stable Storage.

## Selftest Failures

Chassis codes are the key to debugging selftest errors. If a failure is found during selftest, chassis codes are displayed in the LCD. The procedure for using these codes to debug a failure is as follows:

1. Using Table 3-2., “Chassis Codes for B Class and C Class Workstations,” find the chassis code listed on the LCD.
2. To get additional information about failures from the Boot Console Handler, use the Service Menu’s `pim`, `pdt`, and `ChassisCodes` commands.

In the following table, the FRU column shows messages printed on the LCD that refer to system FRUs. Only `FLT` codes have FRUs associated with them. Some `WRN` codes are also device specific, especially to IODC calls; for example, `8xxx` codes. `TST` and `INI` codes do not necessarily correspond to any FRU. All codes are listed in numeric order.

## Chassis Codes

Table 3-2. lists all of the chassis codes for the B Class and C Class workstations.

**Table 3-2. Chassis Codes for B Class and C Class Workstations**

Ostat	Code	FRU	Message	Description
FLT	1n01	SYS BD	HPMC occurred	CPU <i>n</i> detected an unexpected HPMC.
FLT	1n02	SYS BD	powerfail intrpt	CPU <i>n</i> detected an unexpected power fail interrupt.
FLT	1n03	SYS BD	recvry cntr trap	CPU <i>n</i> detected an unexpected recovery counter trap.
FLT	1n04	SYS BD	external intrrpt	CPU <i>n</i> detected an unexpected external interrupt.
FLT	1n05	SYS BD	LPMC occurred	CPU <i>n</i> detected an unexpected LPMC.
FLT	1n06	SYS BD	ITLB mis/Ipq flt	CPU <i>n</i> detected an unexpected ITLB miss or instruction page fault.
FLT	1n07	SYS BD	I mem prot trap	CPU <i>n</i> detected an unexpected instruction memory protection trap.
FLT	1n08	SYS BD	illegal inst trp	CPU <i>n</i> detected an unexpected illegal instruction trap.
FLT	1n09	SYS BD	break instr trap	CPU <i>n</i> detected an unexpected break instruction trap.
FLT	1n0A	SYS BD	privilgd op trap	CPU <i>n</i> detected an unexpected privileged operation trap.
FLT	1n0B	SYS BD	privlgd reg trap	CPU <i>n</i> detected an unexpected privileged register trap.
FLT	1n0C	SYS BD	overflow trap	CPU <i>n</i> detected an unexpected overflow trap.
FLT	1n0D	SYS BD	conditional trap	CPU <i>n</i> detected an unexpected conditional trap.
FLT	1n0E	SYS BD	assist exep trap	CPU <i>n</i> detected an unexpected assist exception trap.
FLT	1n0F	SYS BD	DTLB mis/Dpg flt	CPU <i>n</i> detected an unexpected DTLB miss or data page fault.
FLT	1n10	SYS BD	non-acc ITLB mis	CPU <i>n</i> detected an unexpected non-access ITLB miss fault.
FLT	1n11	SYS BD	non-acc DTLB mis	CPU <i>n</i> detected an unexpected non-access DTLB miss or data page fault.
FLT	1n12	SYS BD	data mem prot tr	CPU <i>n</i> detected an unexpected data memory protection trap.

**Table 3-2. Chassis Codes for B Class and C Class Workstations**

Ostat	Code	FRU	Message	Description
FLT	1n13	SYS BD	data mem brk trp	CPU <i>n</i> detected an unexpected data memory break trap.
FLT	1n14	SYS BD	TLB dirty bit tr	CPU <i>n</i> detected an unexpected TLB dirty bit trap.
FLT	1n15	SYS BD	page refrnce trp	CPU <i>n</i> detected an unexpected page reference trap.
FLT	1n16	SYS BD	assist emul trap	CPU <i>n</i> detected an unexpected assist emulation trap.
FLT	1n17	SYS BD	hi-priv xfer trp	CPU <i>n</i> detected an unexpected higher-privilege transfer trap.
FLT	1n18	SYS BD	lo-priv xfer trp	CPU <i>n</i> detected an unexpected lower-privilege transfer trap.
FLT	1n19	SYS BD	taken branch trp	CPU <i>n</i> detected an unexpected taken-branch trap.
FLT	1n1A	SYS BD	data mem acc rts	CPU <i>n</i> detected an unexpected data memory access rights trap.
FLT	1n1B	SYS BD	data mem prot ID	CPU <i>n</i> detected an unexpected data memory protection ID trap.
FLT	1n1C	SYS BD	unalign data ref	CPU <i>n</i> detected an unexpected unaligned data reference trap.
FLT	1n1D	SYS BD	perf mon intrrpt	CPU <i>n</i> detected an unexpected performance monitor interrupt.
TST	1n20	SYS BD	CPUn basic test	CPU <i>n</i> is starting its basic operations self-test.
TST	1n21	SYS BD	CPUn alu test	CPU <i>n</i> is starting its arithmetic and logical unit self-test.
TST	1n22	SYS BD	CPUn branch test	CPU <i>n</i> is starting its branch instruction self-test.
TST	1n23	SYS BD	CPUn arith cond	CPU <i>n</i> is starting its arithmetic condition self-test.
TST	1n24	SYS BD	CPUn bit ops	CPU <i>n</i> is starting its bit operation instruction self-test.
TST	1n25	SYS BD	CPUn cntrl regs	CPU <i>n</i> is starting its control register self-test.
TST	1n26	SYS BD	CPUn ext intrpt	CPU <i>n</i> is starting its external interrupt self-test.

**Table 3-2. Chassis Codes for B Class and C Class Workstations**

Ostat	Code	FRU	Message	Description
TST	1n27	SYS BD	CPUn itimer test	CPU <i>n</i> is starting its interval timer self-test.
TST	1n28	SYS BD	CPUn multi-media	CPU <i>n</i> is starting its multi-media instructions self-test.
TST	1n29	SYS BD	CPUn shadow reg	CPU <i>n</i> is starting its shadow register self-test.
TST	1n2A	SYS BD	CPUn diagnse reg	CPU <i>n</i> is starting its diagnose register self-test.
TST	1n2B	SYS BD	CPUn rdr test	CPU <i>n</i> is starting its remote diagnose register self-test.
TST	1n2C	SYS BD	CPUn bypass test	CPU <i>n</i> is starting its integer bypass operation self-test.
TST	1n30	SYS BD	CPUn start est	CPU <i>n</i> is starting its early (pre-memory) self-tests.
WRN	1n31	SYS BD	CPUn skip est	CPU <i>n</i> is bypassing its early self-tests to save time.
FLT	1n32	SYS BD	CPUn bad tst mod	CPU <i>n</i> detected an unsupported system mode.
INI	1n3C	SYS BD	CPUn initialize	CPU <i>n</i> is initializing after self-tests.
TST	1n3E	SYS BD	CPUn exit est	CPU <i>n</i> finished its early self-tests.
TST	1nA0	SYS BD	CPUn fpu tests	CPU <i>n</i> is starting its floating-point unit self-tests.
TST	1nA1	SYS BD	CPUn fpu reg tst	CPU <i>n</i> is starting its floating-point register self-test.
TST	1nA2	SYS BD	CPUn fpu inst	CPU <i>n</i> is starting its floating-point instruction self-test.
TST	1nA3	SYS BD	CPUn fpu traps	CPU <i>n</i> is starting its floating-point trap self-test.
TST	1nA4	SYS BD	CPUn fpu misc	CPU <i>n</i> is starting its floating-point miscellaneous operations self-test.
TST	1nA5	SYS BD	CPUn fpu bypass	CPU <i>n</i> is starting its floating-point bypassing self-test.
TST	1nB1	SYS BD	CPUn TLB RAM tst	CPU <i>n</i> is starting its TLB register self-test.
TST	1nB2	SYS BD	CPUn TLB trans	CPU <i>n</i> is starting its TLB translation self-test.

**Table 3-2. Chassis Codes for B Class and C Class Workstations**

Ostat	Code	FRU	Message	Description
FLT	1nBA	SYS BD	monarch CPU fail	The monarch CPU failed.
FLT	1nBB	SYS BD	bad CPU $n$ number	The CPU identifier was out of range.
FLT	1nBF	SYS BD	CPU $n$ halt boot	Bootstrap failure--machine halted.
INI	1nCA	SYS BD	CPU $n$ sys bus arb	Monarch CPU is initializing the system bus arbitration.
WRN	1nCD	SYS BD	CPU $n$ deconfig	CPU $n$ deconfigured itself.
WRN	1nCE	SYS BD	CPU $n$ extinguish	PDC_PROC halted CPU $n$ .
FLT	1nCF	SYS BD	slaven failed	Slave CPU $n$ failed self-test.
WRN	1mDs	SYS BD	slaves deconfig	Monarch CPU $m$ deconfigured slave CPU $s$ .
WRN	1nEF	SYS BD	CPU $n$ slftst warn	CPU $n$ detected a non-fatal error during its self-tests.
WRN	1mFs	SYS BD	mon $m$ stop slaves	Monarch CPU $m$ halted slave CPU $s$ .
INI	1nFC	SYS BD	CPU $n$ sync'ing	CPU $n$ is synchronizing with the rest of the system.
INI	1nFD	SYS BD	CPU $n$ stat wd tst	CPU $n$ is testing the system status word.
FLT	1nFF	SYS BD	monarch $n$ selftst	Monarch CPU $n$ failed self-test.
TST	2n20	SYS BD	CPU $n$ icache RAM	CPU $n$ is starting its instruction cache RAM self-test.
FLT	2n25	SYS BD	CPU $n$ ic ld d err	CPU $n$ detected a data error during data cache load.
FLT	2n26	SYS BD	CPU $n$ ic ld t err	CPU $n$ detected a tag error during data cache load.
TST	2n30	SYS BD	CPU $n$ icache tag	CPU $n$ is starting its instruction cache tag self-test.
TST	2n40	SYS BD	CPU $n$ icache par	CPU $n$ is starting its instruction cache parity detection self-test.
TST	2n50	SYS BD	CPU $n$ dc stor que	CPU $n$ is starting its data cache store queue self-test.
FLT	2n51	SYS BD	CPU $n$ dc st q err	CPU $n$ detected an error during its data cache store queue self-test.
TST	2n70	SYS BD	CPU $n$ dcache RAM	CPU $n$ is starting its data cache RAM self-test.
TST	2n80	SYS BD	CPU $n$ dcache tag	CPU $n$ is starting its data cache tag self-test.



**Table 3-2. Chassis Codes for B Class and C Class Workstations**

Ostat	Code	FRU	Message	Description
TST	2n90	SYS BD	CPUn dcache ECC	CPU <i>n</i> is starting its data cache ECC self-test.
FLT	2BAD	SYS BD	assertion fail	A firmware assertion failed.
TST	3n00	SYS BD	ROM checksum tst	Monarch CPU <i>n</i> is testing the boot ROM integrity.
FLT	3n00	SYS BD	ROM checksum BAD	The boot ROM failed checksum.
INI	3n00	SYS BD	ROM checksum ok	The boot ROM passed checksum.
TST	3n01	SYS BD	PDH control test	Monarch CPU <i>n</i> is testing PDH control register.
INI	3n01	SYS BD	PDH control init	Monarch CPU <i>n</i> is initializing the PDH control register.
FLT	3n01	SYS BD	PDH control err	Monarch CPU <i>n</i> detected an error in the PDH control register.
TST	3n02	SYS BD	scratch RAM test	Monarch CPU <i>n</i> is testing scratch RAM.
INI	3n02	SYS BD	scratch RAM ok	The scratch RAM test failed.
FLT	3n02	SYS BD	scratch RAM bad	The scratch RAM test passed.
WRN	3n03	SYS BD	stbl st read err	CPU <i>n</i> detected a non-fatal error reading the stable store.
FLT	3n03	SYS BD	stbl st read err	CPU <i>n</i> detected a non-fatal error reading the stable store.
INI	3nC4	SYS BD	clearing EEPROM	Monarch CPU <i>n</i> is clearing the EEPROM.
INI	3nD4	SYS BD	deflting EEPROM2	Monarch CPU <i>n</i> is initializing the EEPROM to system defaults.
WRN	3n04	SYS BD	EEPROM write err	CPU <i>n</i> detected a non-fatal error writing the EEPROM.
FLT	3n04	SYS BD	EEPROM write err	CPU <i>n</i> detected a fatal error writing the EEPROM.
FLT	3n05	SYS BD	EEPROM wrt limit	CPU <i>n</i> detected a fatal error writing the EEPROM.
WRN	3n06	SYS BD	EEPROM read err	CPU <i>n</i> detected a non-fatal error reading the EEPROM.
FLT	3n06	SYS BD	EEPROM read err	CPU <i>n</i> detected a fatal error reading the EEPROM.
INI	3n07	SYS BD	CPUn invoke LDB	CPU <i>n</i> is starting the low-level debugger.

**Table 3-2. Chassis Codes for B Class and C Class Workstations**

Ostat	Code	FRU	Message	Description
FLT	3n09	SYS BD	bad sys mde byte	CPU <i>n</i> detected an unsupported system mode.
WRN	3n1A	SYS BD	hversion mismtch	Stable store hardware version doesn't match system.
TST	3n1B	SYS BD	chck model strng	Check model string with version in stable store.
WRN	3n1B	SYS BD	model str msmtch	Model string doesn't match that in stable store.
FLT	3n1B	SYS BD	fatal model str	Error reading model string from stable store.
TST	3n1C	SYS BD	test software ID	Check LANIC address.
WRN	3n1C	SYS BD	update sw ID	Update LANIC address.
FLT	3n1C	SYS BD	update sw ID err	Error updating LANIC address.
INI	3n2s	SYS BD	Invoke LDB: <i>s</i>	CPU <i>n</i> is awaiting the low-level debugger for <i>s</i> more seconds.
TST	3nBC	IO BD	test sys clocks	CPU <i>n</i> is verifying processor clocks with the real-time clock.
INI	3nBC	SYS BD	init sys clocks	CPU <i>n</i> has initialized the processor clocks.
FLT	3nBC	IO BD	RTC tick timeout	The real-time clock is ticking too slowly or not at all.
TST	3nCD	SYS BD	check defaults	CPU <i>n</i> is initializing stable store values to system defaults.
INI	3nCD	SYS BD	init defaults	CPU <i>n</i> finished initializing stable store values.
FLT	3nCD	SYS BD	init EEPROM err	CPU <i>n</i> detected an error writing to stable store.
FLT	3nEC	SYS BD	bad sys config	CPU <i>n</i> detected an illegal CPU board configuration.
FLT	3nF4	SYS BD	EEPROM boot limt	CPU <i>n</i> detected a fatal error writing the EEPROM.
FLT	3nFC	SYS BD	bad sys bd id	CPU <i>n</i> cannot identify CPU board.
TST	4n00	SYS BD	CPUn start 1st	CPU <i>n</i> is starting its late (with memory) self-tests.
WRN	4n01	SYS BD	CPUn skip 1st	CPU <i>n</i> is bypassing its late self-tests to save time.

**Table 3-2. Chassis Codes for B Class and C Class Workstations**

Ostat	Code	FRU	Message	Description
TST	4n0E	SYS BD	CPUn exit lst	CPU <i>n</i> finished its late self-tests.
TST	4n20	SYS BD	CPUn lst erly st	CPU <i>n</i> is re-executing some of its early self-tests from system memory.
TST	4n21	SYS BD	CPUn lst basic	CPU <i>n</i> is re-executing its basic operations self-test.
TST	4n22	SYS BD	CPUn lst alu	CPU <i>n</i> is re-executing its arithmetic and logic unit self-test.
TST	4n23	SYS BD	CPUn lst branch	CPU <i>n</i> is re-executing its branch instruction self-test.
TST	4n24	SYS BD	CPUn lst arth cd	CPU <i>n</i> is re-executing its arithmetic conditions self-test.
TST	4n25	SYS BD	CPUn lst bit ops	CPU <i>n</i> is re-executing its bit operations self-test.
TST	4n26	SYS BD	CPUn lst ctl reg	CPU <i>n</i> is re-executing its control register self-test.
TST	4n27	SYS BD	CPUn lst ext int	CPU <i>n</i> is re-executing its external interrupt self-test.
TST	4n28	SYS BD	CPUn lst itimer	CPU <i>n</i> is re-executing its interval timer self-test.
TST	4n29	SYS BD	CPUn lst mltimed	CPU <i>n</i> is re-executing its multi-media instructions self-test.
TST	4n2A	SYS BD	CPUn lst shadow	CPU <i>n</i> is re-executing its shadow register self-test.
TST	4n2B	SYS BD	CPUn lst dg regs	CPU <i>n</i> is re-executing its diagnose register self-test.
TST	4n2C	SYS BD	CPUn lst rdrrs	CPU <i>n</i> is re-executing its remote diagnose register self-test.
TST	4n2D	SYS BD	CPUn lst bypass	CPU <i>n</i> is re-executing its integer bypass operation self-test.
TST	4n30	SYS BD	CPUn cache byte	CPU <i>n</i> is starting its data cache sub-word operations self-test.
TST	4n40	SYS BD	CPUn cache flush	CPU <i>n</i> is starting its cache flush self-test.
TST	4n50	SYS BD	CPUn icache miss	CPU <i>n</i> is starting its instruction cache miss self-test.
TST	4n60	SYS BD	CPUn dcache miss	CPU <i>n</i> is starting its data cache miss self-test.

**Table 3-2. Chassis Codes for B Class and C Class Workstations**

Ostat	Code	FRU	Message	Description
FLT	5n00	SYS BD	unknown bus err	CPU <i>n</i> detected an unknown error on the system bus (Runway).
FLT	5n02	SYS BD	path err assertd	CPU <i>n</i> detected a path error on the system bus (Runway).
FLT	5n04	SYS BD	data parity err	CPU <i>n</i> detected a data, address, or control parity error on the system bus (Runway).
FLT	5n07	SYS BD	Runway dir error	CPU <i>n</i> detected a directed error on the system bus (Runway).
FLT	5n08	SYS BD	Runway broad err	CPU <i>n</i> detected a broadcast error on the system bus (Runway).
FLT	5n0A	SYS BD	illegal response	CPU <i>n</i> received data that did not match any outstanding data request.
FLT	5n0B	SYS BD	bus timeout	CPU <i>n</i> timed out before receiving requested data. The responder is logged in the system responder address.
FLT	5n0C	SYS BD	CPU sync failure	CPU <i>n</i> 's synchronizer detected a rule violation on the system bus (Runway).
INI	7000	DIMM	start DIMM scan	Start looking for installed DIMMs.
INI	7002	SYS BD	init mem tables	Initialize memory data structures.
FLT	7004	SYS BD	mem plt upd fail	Error updating memory platform data.
FLT	7005	DIMM	insufficient mem	Insufficient memory detected to continue.
TST	7010	DIMM	check DIMM order	Start memory DIMM order check.
WRN	7011	DIMM	skip DIMM ord ck	Bypass memory DIMM order check.
FLT	7012	DIMM	DIMM order error	Memory DIMMs are not in the proper order.
FLT	7013	DIMM	DIMM order error	Memory DIMMs are not in the proper order. As a result, the system cannot access one or more DIMMs and has deallocated all inaccessible DIMMs.
TST	7016	DIMM	DIMM pair check	Start memory DIMM pair check (DIMMs in a pair (e.g. 0a/0b) must match in J7xxx).
WRN	7017	DIMM	skip mem pair ck	Bypass memory DIMM set check.
FLT	701F	DIMM	no memory found	Memory scan couldn't find any DIMMs.
TST	7020	SYS BD	search for IMM	Try to find a single memory bank to use for the initial memory module.

**Table 3-2. Chassis Codes for B Class and C Class Workstations**

Ostat	Code	FRU	Message	Description
TST	703 <i>s</i>	DIMM	DIMM <i>s</i> IMM vrfy	DIMM <i>s</i> was the initial memory module last boot. Verify it still works.
FLT	704 <i>s</i>	DIMM	DIMM <i>s</i> IMM fail	DIMM <i>s</i> failed the initial memory module test.
TST	705 <i>s</i>	DIMM	DIMM <i>s</i> IMM test	Test DIMM in slot <i>s</i> as the initial memory module.
INI	706 <i>s</i>	DIMM	DIMM <i>s</i> is IMM	DIMM <i>s</i> chosen as initial memory module.
INI	70F0	DIMM	DIMM scan done	Memory DIMM scan complete.
TST	7100	SYS BD	mem register tst	Start testing registers in memory controller.
WRN	7101	SYS BD	skip mem reg tst	Bypass the memory controller register test.
FLT	7102	SYS BD	mem addr reg tst	Firmware detected an error in the memory controller address registers.
FLT	7103	SYS BD	mem mbat reg tst	Firmware detected an error in the memory controller bank registers.
FLT	7104	SYS BD	mem reg tst fail	Firmware detected an error in the memory controller memory registers.
FLT	7105	SYS BD	mem err reg test	Firmware detected an error in the memory controller error registers.
FLT	7106	SYS BD	mem err clr fail	Firmware was unable to clear the error registers after testing.
INI	7200	DIMM	strt DIMM detect	Start the Serial Presence Detection (SPD) to search for memory DIMMs.
INI	7201	DIMM	DIMM detect <i>x</i> %	SPD is <i>x</i> % finished.
WRN	7202	SYS BD	skip DIMM detect	Bypass Serial Presence Detection.
FLT	7203	DIMM	unsupp DIMM type	SPD found an unsupported DIMM type.
FLT	7204	DIMM	SPD fatal error	SPD detected an unexpected, fatal error.
INI	7205	DIMM	add HP DIMM type	New HP manufactured DIMM type added to tables.
INI	7206	DIMM	non-HP DIMM type	New non-HP DIMM type added to tables (use at own risk).
FLT	7207	DIMM	DIMM table full	The DIMM table is full--cannot add new type.
FLT	7208	DIMM	no DIMMs found	SPD didn't find any memory DIMMs.

**Table 3-2. Chassis Codes for B Class and C Class Workstations**

Ostat	Code	FRU	Message	Description
INI	721s	DIMM	is DIMM s inst?	SPD is checking memory slot s.
INI	722s	DIMM	???? DIMM in s	SPD found a DIMM in slot s, but can't determine its size. DIMM will not be used.
INI	723s	DIMM	128M DIMM in s	SPD found a 128MB DIMM in slot s.
INI	724s	DIMM	256M DIMM in s	SPD found a 256MB DIMM in slot s.
INI	725s	DIMM	512M DIMM in s	SPD found a 512MB DIMM in slot s.
FLT	72As	DIMM	DIMM s checksum	DIMM in slot s failed SPD checksum and will not be used.
FLT	72Cs	DIMM	DIMM s mismatch	DIMM in slot s didn't match the other in pair. (J7xxx only--DIMMs must be in matched pairs.)
FLT	72Ds	DIMM	DIMM s load err	Memory DIMMs are not in the proper order. As a result, the system cannot access DIMM s and has deallocated it.
INI	7300	SYS BD	mem config start	Starting main memory configuration.
TST	7301	SYS BD	check mem config	Checking for memory configuration change since last boot.
WRN	7302	SYS BD	mem confg changd	Memory physical configuration changed since last boot.
INI	7303	SYS BD	use confg change	Memory physical configuration didn't use saved configuration change. Use stored configuration data.
INI	7304	SYS BD	build mem intrlv	Building memory configuration with all DIMMs interleaved.
INI	7305	SYS BD	save mem config	Saving memory configuration information in non-volatile memory.
WRN	7306	SYS BD	use alt mem conf	Memory will be configured from fixed values, instead of detected DIMMs.
INI	7307	SYS BD	interleve memory	Generating the memory interleave.
FLT	7308	SYS BD	PDT is disabled	Firmware detected bad memory pages, but the Page Deallocation Table is disabled.
FLT	7309	DIMM	insufficient mem	Insufficient error-free memory to continue.
FLT	730C	SYS BD	mem intrlv fail	Memory interleave generation failed.
INI	730F	SYS BD	mem config done	Main memory configuration complete.

**Table 3-2. Chassis Codes for B Class and C Class Workstations**

Ostat	Code	FRU	Message	Description
TST	7400	DIMM	non-dest mem tst	Starting non-destructive memory test.
TST	740F	DIMM	non-dst tst done	Non-destructive memory test complete.
INI	7500	SYS BD	memory reset	Resetting memory system.
WRN	7501	SYS BD	mem log clr warn	Memory error logs didn't clear on first try.
FLT	7502	SYS BD	mem err log fail	Firmware could not clear memory error logs.
TST	7600	DIMM	dest mem test	Starting the destructive memory test.
WRN	7601	DIMM	mem init only	Skip the test, just initialize memory to save time.
TST	7602	DIMM	tst 1st mem page	Starting 3-pass test of first memory page.
TST	7603	DIMM	tst rest of mem	Starting 3-pass test of the rest of memory.
TST	7604	DIMM	start 1st pass	Starting 1st pass of memory test (write pseudorandom sequence).
TST	7605	DIMM	1st pass x%	First pass is x% complete.
TST	7606	DIMM	start 2nd pass	Starting 2nd pass of memory test (verify pseudorandom sequence, write inverse).
TST	7607	DIMM	2nd pass x%	Second pass is x% complete.
TST	7608	DIMM	start 3rd pass	Starting 3rd pass of memory test (verify inverse sequence).
TST	7609	DIMM	3rd pass x%	Third pass is x% complete.
TST	760A	DIMM	start mem init	Starting memory initialization. (Initialize to zero to set ECC.)
TST	760B	DIMM	mem init x%	Memory initialization is x% complete.
WRN	760C	DIMM	repeat dest test	Re-execute destructive test for hardware troubleshooting.
FLT	760D	DIMM	mem code cpy err	Firmware tried to copy code from ROM to memory, but the copy didn't match the original.
FLT	7610	DIMM	ECC wrt/read err	Writing and reading back good data caused memory ECC error.
FLT	7611	DIMM	ECC single data	Memory ECC test failed to detect single-bit data error.
FLT	7612	DIMM	ECC single ECC	Memory ECC test failed to detect single-bit ECC error.

**Table 3-2. Chassis Codes for B Class and C Class Workstations**

Ostat	Code	FRU	Message	Description
FLT	7613	DIMM	ECC multipl data	Memory ECC test failed to detect multiple-bit data error.
FLT	7614	DIMM	ECC multipl signl	Memory ECC test failed to signal multiple-bit error.
FLT	7800	SYS BD	mem err summary	Printing memory error summary word to RS-232.
FLT	7801	SYS BD	bus ctrl par err	System bus (Runway) control parity error detected.
FLT	7802	SYS BD	bus addr par err	System bus (Runway) address parity error detected.
FLT	7803	SYS BD	bus data par err	System bus (Runway) data parity error detected.
FLT	7804	SYS BD	mem out of range	Memory access outside configured memory space.
FLT	7805	SYS BD	bus broadcst err	System bus (Runway) broadcast error detected.
FLT	7806	SYS BD	mem addr par err	Memory bus address parity error detected.
FLT	7807	SYS BD	mem ctrlr stat wd	Printing memory controller status word to RS-232.
FLT	781s	SYS BD	DIMM s uncor err	Uncorrectable ECC error detected in DIMM s.
FLT	782s	SYS BD	DIMM s corr err	Correctable ECC error detected in DIMM s.
FLT	7840	SYS BD	unexpected HPMC	Unexpected HPMC detected.
FLT	7841	SYS BD	mem status invld	Memory error status word is invalid.
FLT	7842	SYS BD	mem summ invalid	Memory summary word is invalid.
FLT	7843	SYS BD	fwd prog invalid	Memory forward progress word is invalid.
FLT	7844	SYS BD	mem HPMC summ wd	Printing memory error summary word to RS-232.
FLT	7845	SYS BD	mem ctrlr stat wd	Printing memory controller status word to RS-232.
FLT	7846	SYS BD	mem err overflow	Multiple memory errors detected.
FLT	7848	SYS BD	addr not mapped	Memory address outside configured memory space.



**Table 3-2. Chassis Codes for B Class and C Class Workstations**

Ostat	Code	FRU	Message	Description
FLT	785s	DIMM	MBE in DIMM s	Destructive memory test detected an uncorrectable memory error in DIMM s.
FLT	786s	DIMM	SBE&MBE DIMM s	Destructive memory test detected both an uncorrectable and a correctable memory error in DIMM s.
FLT	787s	DIMM	mem err DIMM s	Destructive memory test detected a pattern compare error in DIMM s.
FLT	788s	DIMM	SBE in DIMM s	Destructive memory test detected a correctable memory error in DIMM s.
FLT	7890	DIMM	MBE overwrt SBE	Firmware replaced a correctable memory error entry in the PDT with an uncorrectable memory error entry at the same address.
FLT	7891	DIMM	dup entry in PDT	The PDT already contains an entry at that address.
FLT	7892	SYS BD	PDT write error	Error adding the entry to the PDT.
FLT	7893	SYS BD	PDT is full	The PDT is full--cannot add new entry.
FLT	7900	SYS BD	no DMT entry	Internal error--cannot find DIMM entry.
FLT	7901	SYS BD	no rank entry	Internal error--cannot find rank entry.
FLT	7902	SYS BD	bad refrsh intvl	Computed refresh interval is invalid.
FLT	7903	SYS BD	mem intrlv fail	Cannot generate memory interleave.
FLT	7904	SYS BD	mem reloc failed	Cannot interleave with relocated range (3.75GB - 4.0GB).
FLT	7905	SYS BD	mem intrlv error	Undefined memory interleave failure.
FLT	79FF	SYS BD	mem firmware err	Internal error--never expected this to happen.
WRN	80F3	SYS BD	err rd IODC byte	Cannot read IODC from ROM or card.
WRN	80F4	EXT IO	boot read error	Cannot load IODC entry_init for boot device.
WRN	80F5	EXT IO	boot exec error	Error initializing boot device.
WRN	80F6	EXT IO	boot read error	Cannot load IODC entry_io for boot device.
WRN	80F7	EXT IO	boot IO error	Error detected during boot device I/O.
WRN	80F8	EXT IO	invalid boot dev	Invalid boot device class; bad IODC?
WRN	80FC	EXT IO	invalid boot dev	Unexpected error; bad IODC?

**Table 3-2. Chassis Codes for B Class and C Class Workstations**

Ostat	Code	FRU	Message	Description
INI	8800	IOCARD	PCI BusWlk start	Starting PCI bus and device discovery.
INI	88 <i>r</i> 1	IOCARD	PCI Rope <i>r</i> walk	Starting PCI bus and device discovery on Rope <i>r</i> .
INI	8802	IOCARD	PCI BusWalk done	PCI bus and device discovery complete.
INI	8803	SYS BD	PCI alloc done	Done allocating address space for PCI devices.
INI	8804	SYS BD	PCI config done	Done configuring PCI devices.
FLT	881 <i>r</i>	IO BD	R2PCIr not found	Rope-to-PCI bridge <i>r</i> not found.
WRN	882 <i>r</i>	IO BD	R2PCIr not found	Rope-to-PCI bridge <i>r</i> initialization failed.
FLT	883 <i>r</i>	IO BD	Roper config err	Rope <i>r</i> configuration failed.
INI	884 <i>r</i>	EXT IO	Roper debug tggl	Rope <i>r</i> debug register toggled.
FLT	884 <i>r</i>	EXT IO	Roper tgl fail	Rope <i>r</i> debug register toggle failed.
INI	8850	SYS BD	early rope0 init	Initializing rope 0 for early RS-232 output.
FLT	8850	SYS BD	rope0 init fail	Couldn't initialize rope 0.
INI	8860	SYS BD	rope0 init done	Rope 0 initialization complete.
INI	8870	IO BD	early R2PCI init	Initializing Rope-to-PCI bridge 0 for early RS-232 output.
FLT	8870	IO BD	R2PCI init fail	Couldn't initialize Rope-to-PCI bridge 0.
INI	8880	IO BD	R2PCI init done	Rope-to-PCI bridge 0 initialization complete.
INI	8890	IO BD	early Super init	Initializing Super-I/O for early RS-232 output.
FLT	8890	IO BD	Super init fail	Couldn't initialize Super-I/O.
INI	88A0	IO BD	Super init done	Super-I/O initialization complete.
WRN	8A03	EXT IO	No graph console	Cannot re-establish communications with the graphics console.
WRN	8A04	EXT IO	No USB keyboard	Cannot re-establish communications with the USB keyboard.
TST	8C06	EXT IO	PCI BIST test	Running PCI Built-In Self-Test
WRN	8C07	EXT IO	PCI BIST error	PCI Built-In Self-Test failed.
WRN	8C08	SYS BD	PCI alloc error	PCI address space allocation failed.
WRN	8C09	IO BD	PCI mem mngr err	Memory allocation for PCI device failed.

**Table 3-2. Chassis Codes for B Class and C Class Workstations**

Ostat	Code	FRU	Message	Description
WRN	8C0A	EXT IO	PCI mem type err	PCI device requested invalid memory type.
WRN	8C0B	IO BD	PCI max bus dpth	PCI bus depth exceeded maximum supported depth.
WRN	8C0C	EXT IO	PCI dev not cnfg	Unable to configure PCI device.
WRN	8C0F	IO BD	dev tree ovrflow	Data space for PCI devices is full.
WRN	8DEC	IO BD	init LAN SR0M	Initializing the core LAN serial EPROM.
SHU	8DEC	IO BD	resetting system	Restarting system after core LAN initialization.
FLT	8E10	IO BD	PARALEL port cfg	Parallel port configuration failed.
FLT	8E11	IO BD	SERIAL1 port cfg	Serial 1 port configuration failed.
FLT	8E12	IO BD	SERIAL2 port cfg	Serial 2 port configuration failed.
FLT	8E13	IO BD	FLOPPY drive cfg	Floppy drive configuration failed.
FLT	8E20	IO BD	bad USB port cfg	USB port configuration failed.
WRN	9001	EXT IO	no console found	Search for console display device failed.
INI	9151	IO BD	init SERIAL_1	Initializing serial 1 port as console display.
INI	9152	IO BD	init SERIAL_2	Initializing serial 2 port as console display.
INI	915F	IO BD	init unknown dev	Initializing unknown device as console display.
INI	916s	EXT IO	init PCI slot s	Initializing PCI device in slot s as console display.
INI	91DB	IO BD	init SERIAL_LDB	Initializing serial LDB port as console display.
INI	9C51	IO BD	consol is SER_1	Console display is on serial port 1.
WRN	9C51	IO BD	bad init SERIAL1	Serial port 1 failed to initialize as a console device.
INI	9C52	IO BD	consol is SER_2	Console display is on serial port 2.
INI	9160	EXT IO	builtin GRAPHICS	Initializing built-in graphics as console display.
WRN	9C52	IO BD	bad init SERIAL2	Serial port 2 failed to initialize as a console device.

**Table 3-2. Chassis Codes for B Class and C Class Workstations**

Ostat	Code	FRU	Message	Description
INI	9C6s	EXT IO	consol is GRAPHs	Console display is on graphics card in PCI slot s.
WRN	9C6s	EXT IO	bad PCI slot s	Graphics in PCI slot s failed to initialize as a console device.
INI	9C8t	EXT IO	cnfg mon type t	Set graphics console to monitor type t. (Seen when cycling through types.)
WRN	9C8t	EXT IO	mon type t fail	Failed to configure console to monitor type t.
INI	9CDB	IO BD	consl is SER_LDB	Console display is on serial LDB port.
WRN	9CDB	IO BD	bad init SER_LDB	Serial LDB port failed to initialize as a console device.
FLT	A088	IO BD	consl path fault	Unable to boot--no console device found.
WRN	A008	EXT IO	no boot device	Unable to boot--no bootable device found.
WRN	A0BD	EXT IO	device not ready	Boot device not ready--operation may be retried.
FLT	A0FF	EXT IO	unknown launch	Unable to boot. Explanation may appear on console.
WRN	A50F	EXT IO	init pri pth err	Unable to boot from primary boot device.
WRN	A70F	EXT IO	init otr pth err	Unable to boot from non-primary boot device.
INI	C10m	SYS BD	CPUm is monarch	CPU m was chosen as the monarch processor. (All other CPUs are slaves.)
INI	C30m	SYS BD	monarchm test	CPU m finished the monarch-only tests and system initialization.
INI	C30C	SYS BD	mnrch slv chck	The monarch CPU is checking whether the slaves are in the correct rendezvous.
INI	C3FF	SYS/IO	late monarch tst	The monarch CPU is starting the late (post-memory) monarch-only tests.
FLT	C3FF	SYS/IO	late monarch flt	The late (post-memory) monarch-only tests failed.
INI	C4CC	SYS BD	initialize ccp	Searching for (lab-only) debugger card.
INI	C4CD	SYS BD	no ccp found	Debugger card not found.
INI	C4CE	SYS BD	ccp disabled	Debugger card disabled.
INI	C4CF	SYS BD	ccp found	Debugger card found.

**Table 3-2. Chassis Codes for B Class and C Class Workstations**

Ostat	Code	FRU	Message	Description
INI	C500	SYS BD	get primary path	Autoboot is reading primary boot path from stable store.
INI	C540	EXT IO	init pri path	Autoboot is trying to boot from primary boot device.
INI	C580	EXT IO	load IPL pri pth	Loading IPL from primary boot device.
WRN	C5F0	EXT IO	err read pri IPL	Error loading IPL from primary boot device.
FLT	C5F0	EXT IO	pri IPL fault	Error loading IPL from primary boot device.
WRN	C5F1	EXT IO	err read pri IPL	Cannot load IPL from primary boot device--load address invalid.
WRN	C5F2	EXT IO	err read pri IPL	Cannot load IPL from primary boot device--file is not IPL image.
WRN	C5F3	EXT IO	err read pri IPL	Cannot load IPL from primary boot device--IPL image size invalid.
WRN	C5F4	EXT IO	err read pri IPL	Cannot load IPL from primary boot device--IPL entry point address invalid.
WRN	C5F8	EXT IO	err read pri IPL	Cannot load IPL from primary boot device--IPL image checksum failed.
INI	C5FF	<blank>	launch pri IPL	Booting from primary boot path.
INI	C642	EXT IO	init kybrd consl	Try to initialize USB keyboard.
FLT	C642	EXT IO	keyboard error	An error was detected trying to access the keyboard.
WRN	C643	EXT IO	keyboard reinit	Keyboard was re-initialized.
WRN	C64F	EXT IO	reset montr type	The console device failed to initialize with the given monitor type. Try again with type 1.
TST	C680	SYS BD	builtin graphics	Look for built-in graphics card.
TST	C68s	SYS BD	test graph in s	Look for graphics card in PCI slot s.
INI	C68s	SYS BD	init graph in s	Successfully initialized graphics card in PCI slot s.
WRN	C680	SYS BD	bultin graphics	built-in graphics initialization failed.
WRN	C68s	SYS BD	fail graph in s	Card in PCI slot s failed graphics initialization or is not a graphics card.

**Table 3-2. Chassis Codes for B Class and C Class Workstations**

Ostat	Code	FRU	Message	Description
INI	C740	EXT IO	init other path	Autoboot is trying to boot from non-primary boot device.
INI	C780	EXT IO	ld IPL othr path	Loading IPL from non-primary boot device.
WRN	C7F0	EXT IO	other IPL fault	Error loading IPL from non-primary boot device.
WRN	C7F1	EXT IO	bad alt IPL read	Cannot load IPL from non-primary boot device--load address invalid.
WRN	C7F2	EXT IO	bad alt IPL read	Cannot load IPL from non-primary boot device--file is not IPL image.
WRN	C7F3	EXT IO	bad alt IPL read	Cannot load IPL from non-primary boot device--IPL image size invalid.
WRN	C7F4	EXT IO	bad alt IPL read	Cannot load IPL from non-primary boot device--IPL entry point address invalid.
WRN	C7F8	EXT IO	bad alt IPL read	Cannot load IPL from non-primary boot device--IPL image checksum failed.
WRN	C7FF	<blank>	launch IPL other	Booting from a device other than the primary boot path.
INI	CB00	SYS BD	TOC initiated	A Transfer of Control entered the firmware TOC handler.
WRN	CB01	SYS BD	no OS TOC vector	There is no TOC vector for the operating system. Firmware will soft boot the system.
WRN	CB02	SYS BD	bad OS TOC addr	The operating system TOC handler vector is invalid. Firmware will soft boot the system.
WRN	CB03	SYS BD	bad OS TOC code	The operating system TOC handler is invalid. Firmware will soft boot the system.
WRN	CB04	SYS BD	bad OS TOC len	The size of the operating system TOC handler is invalid. Firmware will soft boot the system.
WRN	CB05	SYS BD	bad OS TOC chksm	The operating system TOC handler failed the checksum test. Firmware will soft boot the system.
WRN	CB0A	SYS BD	prev TOC logged	Firmware detected unread PIM data from a previous TOC and will not overwrite it. (PIM for this TOC is lost.)

**Table 3-2. Chassis Codes for B Class and C Class Workstations**

Ostat	Code	FRU	Message	Description
INI	CB0B	SYS BD	branch to OS TOC	Branching to the operating system TOC handler.
WRN	CB0C	SYS BD	br OS TOC failed	Branch to the operating system TOC handler failed. Firmware will soft boot the system.
WRN	CB10	SYS BD	LPMC initiated	A Low-Priority Machine Check entered the firmware LPMC handler. The handler should log the error and return to normal operation.
WRN	CB11	SYS BD	icache LPMC err	An instruction cache parity error caused the LPMC.
WRN	CB12	SYS BD	dcache LPMC err	A data cache parity/ECC error caused the LPMC.
WRN	CB13	SYS BD	dcache tag error	The parity error is in the tag portion of the data cache.
WRN	CB14	SYS BD	dcache data err	The parity error is in the data portion of the data cache.
FLT	CB1F	SYS BD	OS LPMC failed	Firmware couldn't branch to the operating system LPMC handler. It will halt the CPU, requiring a power cycle to recover.
WRN	CB71	SYS BD	HPMC occurred	A High-Priority Machine Check caused entry to PDCE_CHECK (the firmware trap handler).
WRN	CB72	SYS BD	LPMC occurred	A Low-Priority Machine Check caused entry to PDCE_CHECK (the firmware trap handler).
WRN	CB73	SYS BD	TOC occurred	A Transfer of Control caused entry to PDCE_CHECK (the firmware trap handler).
FLT	CB9 <i>r</i>	IO BD	Error on rope <i>r</i>	An error was detected on rope <i>r</i> .
FLT	CB99	SYS BD	seed IVA handler	PDC_SEED_ERROR triggered an HPMC.
FLT	CB9A	SYS BD	HPMC overwrite	Firmware is overwriting PIM data from a previous HPMC.
OFF	CBA1	SYS BD	AIOC int dat err	I/O controller internal error.
OFF	CBA2	IO BD	EtoA rope perr	Parity error between I/O controller and Rope-to-PCI bridge.
OFF	CBA3	SYS BD	access invld TLB	An invalid I/O TLB entry was accessed.

**Table 3-2. Chassis Codes for B Class and C Class Workstations**

Ostat	Code	FRU	Message	Description
OFF	CBA4	IO BD	EtoA rp cmd perr	Command parity error between I/O controller and Rope-to-PCI bridge.
OFF	CBA5	IO BD	CDF timeout	Rope Command/Data FIFO is backed up.
OFF	CBA6	IO BD	R2PCI resp tmout	Rope-to-PCI bridge timed out. Could be a failure of the PCI card, rope, or R2PCI bridge.
OFF	CBA7	IO BD	Unknown AIOC err	Unknown I/O controller error.
OFF	CBB1	IO BD	PCI timeout	A PCI card requested the bus but failed to use it.
OFF	CBB2	IO BD	PCI timeout; OV	More than once a PCI card requested the bus but failed to use it.
OFF	CBB3	IO BD	R2PCI intrnl err	Rope-to-PCI bridge internal error.
OFF	CBB4	IO BD	R2PCI int err;OV	Multiple Rope-to-PCI bridge internal errors.
OFF	CBB6	IO BD	PCI data req err	PCI bus data requestor error: R2PCI detected PERR# assertion.
OFF	CBB8	IO BD	PCI D req err;OV	Rope-to-PCI bridge detected multiple PERR# assertions.
OFF	CBBA	IO BD	PCI data par err	PCI bus data parity error.
OFF	CBBC	IO BD	PCI Dpar err;OV	Multiple PCI bus data parity errors.
OFF	CBBE	IO BD	R2PCI intrnl err	Error in R2PCI internal data to PCI bus.
OFF	CBC0	IO BD	R2PCI int err;OV	Multiple R2PCI internal data to PCI bus errors.
OFF	CBC2	IO BD	PCI data parity	PCI data parity error. I/O error log word 3 contains the error address.
OFF	CBC4	IO BD	PCI data par; OV	Multiple PCI data parity errors. I/O error log word 3 contains the error address.
OFF	CBC6	IO BD	R2PCI intrnl err	Rope-to-PCI bridge internal data error: R2PCI detected PERR# assertion.
OFF	CBC8	IO BD	R2PCI int err;OV	Multiple R2PCI internal data errors: R2PCI detected multiple PERR# assertions.
OFF	CBCA	IO BD	PCI data rs err	PCI bus data responder error: R2PCI detected PERR# assertion.



**Table 3-2. Chassis Codes for B Class and C Class Workstations**

Ostat	Code	FRU	Message	Description
OFF	CBCC	IO BD	PCI D rs err; OV	Multiple PCI bus data responder errors: R2PCI detected multiple PERR# assertions.
OFF	CBCE	IO BD	R2PCI T-Abort	Rope-to-PCI bridge signalled Target Abort.
OFF	CBD0	IO BD	R2PCI T-Abort;OV	Rope-to-PCI bridge signalled multiple Target Aborts.
OFF	CBD2	IO BD	PCI parity err	PCI address/command parity error.
OFF	CBD4	IO BD	PCI par err; OV	Multiple PCI address/command parity errors.
OFF	CBD6	IO BD	PCI no DEVSEL#	No PCI device selected (DEVSEL# assertion). I/O error log word 3 contains the error address.
OFF	CBD8	IO BD	PCI no DEVSEL;OV	Multiple DEVSEL# assertions. I/O error log word 3 contains the error address.
OFF	CBDA	IO BD	PCI target abort	A PCI device signalled Target Abort. I/O error log word 3 contains the error address.
OFF	CBDC	IO BD	PCI T-Abort; OV	A PCI device signalled multiple Target Aborts. I/O error log word 3 contains the error address.
OFF	CBDD	IO BD	PCI assrts LOCK#	A PCI device asserted LOCK#.
OFF	CBDE	IO BD	PCI LOCK#; OV	A PCI device asserted LOCK# multiple times.
OFF	CBE0	IO BD	PCI assrts SERR#	A PCI device asserted SERR#: address parity error or other system error.
OFF	CBE2	IO BD	PCI SERR#; OV	A PCI device asserted SERR# multiple times.
OFF	CBE3	IO BD	Unknown PCI err	Unknown PCI error detected.
OFF	CBE6	SYS BD	AtoE rope perr	Parity error between system I/O controller and Rope-to-PCI bridge.
OFF	CBE7	IO BD	R2PCI intrnl err	Rope-to-PCI bridge internal data error.
OFF	CBE8	SYS BD	AtoE rope perr	Command parity error between system I/O controller and Rope-to-PCI bridge.
OFF	CBE9	IO BD	Unknown Rope err	Unknown rope error occurred.
FLT	CBF0	SYS BD	HPMC initiated	A High-Priority Machine Check entered the firmware HPMC handler.

**Table 3-2. Chassis Codes for B Class and C Class Workstations**

Ostat	Code	FRU	Message	Description
FLT	CBF1	SYS BD	no OS HPMC IVA	There is no HPMC vector for the operating system. Firmware will halt the CPU, requiring a power cycle to recover.
FLT	CBF2	SYS BD	bad OS HPMC len	The size of the operating system HPMC handler is invalid. Firmware will halt the CPU, requiring a power cycle to recover.
FLT	CBF3	SYS BD	bad OS HPMC addr	The operating system HPMC handler vector is invalid. Firmware will halt the CPU, requiring a power cycle to recover.
FLT	CBF4	SYS BD	bad OS HPMC cksm	The operating system HPMC handler failed the checksum test. Firmware will halt the CPU, requiring a power cycle to recover.
FLT	CBF5	SYS BD	OS HPMC vector 0	The size of the operating system HPMC handler is zero. Firmware will halt the CPU, requiring a power cycle to recover.
WRN	CBFA	SYS BD	prev HPMC logged	Firmware detected unread PIM data from a previous HPMC and will overwrite it.
FLT	CBFB	SYS BD	brnch to OS HPMC	Branching to the operating system HPMC handler.
FLT	CBFC	SYS BD	OS HPMC br err	Branch to the operating system HPMC handler failed. Firmware will halt the CPU, requiring a power cycle to recover.
FLT	CBFD	SYS BD	unknown check	The firmware trap handler didn't detect an HPMC, LPMC, or TOC.
FLT	CBFE	SYS BD	HPMC during TOC	A High-Priority Machine Check occurred during Transfer of Control processing.
FLT	CBFF	SYS BD	multiple HPMCs	A High-Priority Machine Check occurred while processing another HPMC.
INI	CC0 <i>n</i>	SYS BD	CPUn OS rendezvs	Slave CPU <i>n</i> entering the final rendezvous, waiting for the operating system to awaken it.
INI	CC1 <i>n</i>	SYS BD	CPUn early rend	Slave CPU <i>n</i> entering the early rendezvous, waiting for the monarch CPU to initialize scratch RAM and other system state.
INI	CC2 <i>n</i>	SYS BD	CPUn rendezvous	Slave CPU <i>n</i> entering rendezvous. Slave CPUs enter this rendezvous numerous times during boot.

**Table 3-2. Chassis Codes for B Class and C Class Workstations**

Ostat	Code	FRU	Message	Description
INI	CC3 <i>n</i>	SYS BD	CPUn cache rend	Slave CPU <i>n</i> entering cached rendezvous, waiting for the monarch CPU to configure the system bus.
INI	CC4 <i>n</i>	SYS BD	CPUn mem rendez	Slave CPU <i>n</i> entering memory rendezvous, waiting for the monarch CPU to select a boot device.
TST	D000	SYS BD	micro controller	Firmware is initializing communications with the system controller.
WRN	D004	SYS BD	micro not resp	Firmware detected a communications error with the system controller.
INI	D005	SYS BD	set dom1 fan spd	Firmware is initializing communications with the system controller.
INI	D006	SYS BD	set dom2 fan spd	Firmware is initializing communications with the system controller.
WRN	D007	SYS BD	bad microctl cmd	Firmware detected a communications error with the system controller.
FLT	D01 <i>n</i>	SYS/IO	fan <i>n</i> : failure!	Firmware detected system fan <i>n</i> stopped.
WRN	D02 <i>n</i>	SYS/IO	fan <i>n</i> : too slow!	Firmware detected system fan <i>n</i> is running too slowly.

## Memory Failures

The B Class and C Class system requires Memory Page Deallocation to be implemented. This feature allows the workstation to provide information to the operating system about memory failures.

HP-UX 10.x uses information to map out failing memory areas and continue normal operation. You can use the command `memrpt` with the `detail` switch to obtain information about the Memory Page Deallocation Table (PDT) as well as single-bit errors logged by the system.

```
# /usr/sbin/sysdiag Enter
DUI > logtool Enter
LOGTOOL> memrpt detail Enter
```

The PDT can also be checked using the `pdt` command in the Service menu of the Boot Console Handler (refer to “Boot Console Menus” on page 159).

For allowable memory configurations see Chapter 2 of this manual.

## Running System Verification Tests

HP-UX uses an on-line diagnostics product named Mesa (Support Tools Manager) that allows system operation verification.

Three interfaces are available with the Support Tools Manager:

- a command line interface (accessed through the `cstm` command)
- a menu-driven interface (accessed through the `mstm` command)
- a graphical user interface (accessed through the `xstm` command)

For more information on these user interfaces, see the on-line man pages by entering the following at a command line prompt:

```
man cstm      Enter
man mstm      Enter
man xstm      Enter
```

For information on the enhanced on-line diagnostics, see the enhanced on-line diagnostics, see the *Support Media User's Manual* (HP Part Number B3782-90176).

To access the Support Tools Manager, perform the following steps:

1. In a terminal window, type the following at the `#` prompt to invoke the command line interface:

```
# cstm      Enter
```

2. The following message appears:

```
Support Tools Manager   Version A.01.00
Type 'help' for a list of available commands.
CSTM>
```

3. To verify the system operation, type the following at the `CSTM>` prompt and press **Enter**:

```
CSTM> verify all
```

Messages similar to the following appear:

```
Verification has started on device (CPU).
Verification has started on device (FPU).
CSTM> Verification of(FPU)has completed.
CSTM> Verification of(CPU) has completed.
```

4. Press **Enter** to return to the `CSTM>` prompt after all test results are reported.

5. To exit the Support Tools Manager, enter the following:

```
CSTM> exit Enter
```

If any tests failed, run Self Test and ISL diagnostics to isolate the problem.

## Running ODE-Based Diagnostics

The Offline Diagnostic Environment (ODE) consists of diagnostic modules for testing and verifying system operation. ODE provides all the necessary functions for the user to load specified tests and interact with those tests.

ODE is an ISL utility. To boot ODE:

1. Invoke the ISL environment from the system disk or CD-ROM.
2. Type `ode` [Enter] after the `ISL>` prompt to invoke ODE from the LIF directory on the system disk. The prompt changes to `ODE>`.

Not all of the test modules are available on all systems. To see what test modules are available to run on this system, type `ls` at the `ODE>` prompt. The available modules include the following:

- `wdiag` – tests and verifies the basic functionality of the PA-RISC chip. This tool tests the CPU, cache, TLB and floating point functions.
- `memtest` – tests and verifies the memory arrays. If an error is detected, the diagnostic reports the memory card and its slot number that needs replacement. It also, provides a map of the memory configuration so that the user can identify the types of memory and its slot location.
- `mapper` – identifies the configuration of HPPA systems. It displays path, identification, and revision information of I/O components, configuration of memory controllers, processors, co-processors, cache, and TLB, as well as processor board component revisions and values of various HPPA system identifiers, revisions and capabilities.
- `astrodiag` – tests and verifies the basic functionality of the Astro memory/IO controller chip.
- `siodiag` – tests and verifies the functionality of the super IO multifunction IO chip, including serial, parallel, USB, etc.

For further information on the various ODE commands and a complete listing of the command set, type `help` [Enter] at the `ODE>` prompt or at the prompt of one of the test modules.

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## **4 Field Replaceable Units**

This chapter lists the HP VISUALIZE B Class and C Class Workstation Field Replaceable Units (FRUs) and provides procedures and illustrations showing their removal and replacement.

---

**WARNING**     **For all removal and replacement procedures in this chapter, you must power off the workstation and unplug the workstation power cord from the AC power outlet.**

---

---

**NOTE**         To maintain FCC/EMI compliance, verify that all covers are replaced and that all screws are properly seated.

---

Use the following tools to remove or replace FRUs:

- Torx T-10 driver
- Torx T-15 driver
- Light duty flat blade screw driver with 6-inch (150mm) blade
- Needle-nose pliers
- ESD equipment (see “Electrostatic Discharge (ESD) Precautions” on page 196)
- Pen knife

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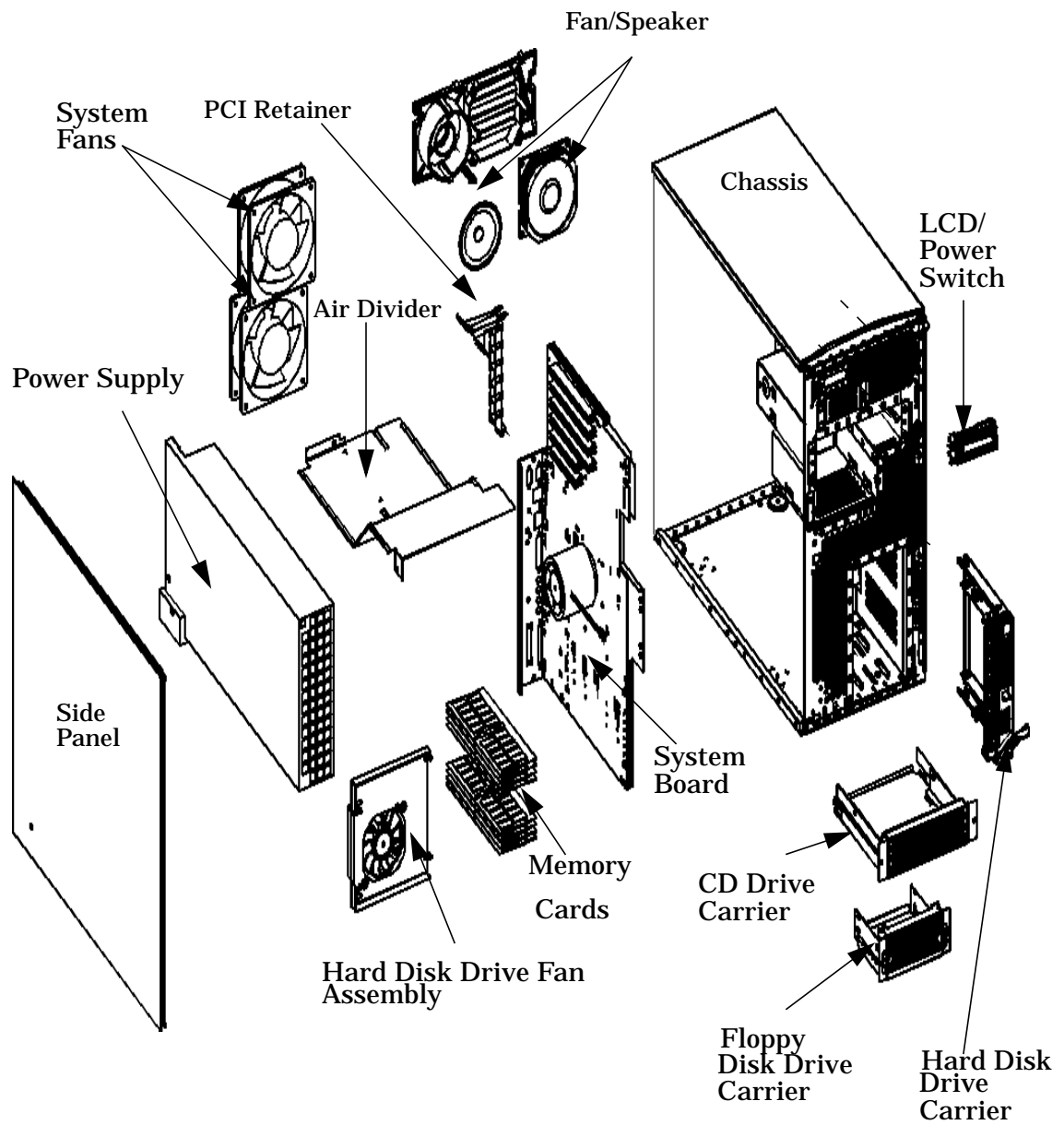
**NOTE**         To maintain FCC/EMI compliance, verify that all covers are replaced and that all gasket material is intact.

---

Figure 4-1. shows an exploded view of the internal components (FRUs) in the B Class and C Class workstations.

Refer to this figure for the locations of the various workstation FRUs while performing the FRU removal and replacement procedures in this chapter.



**Figure 4-1. B Class and C Class Workstation Main Components**

**Figure 4-2. CD Drive Bracket Assembly**

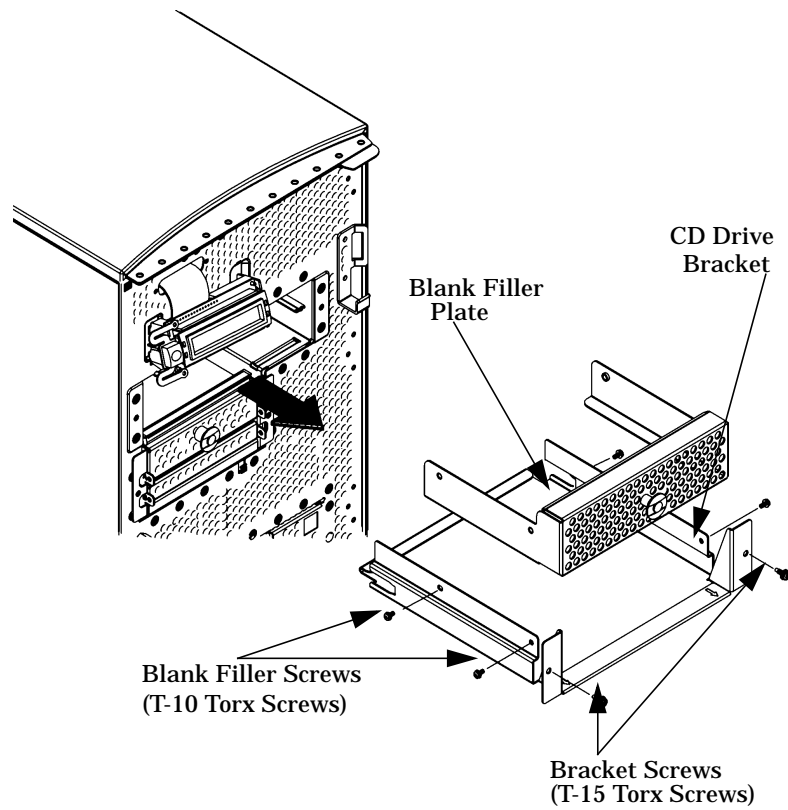


Figure 4-2. shows the CD Drive Bracket FRUs for the B Class and C Class workstation.

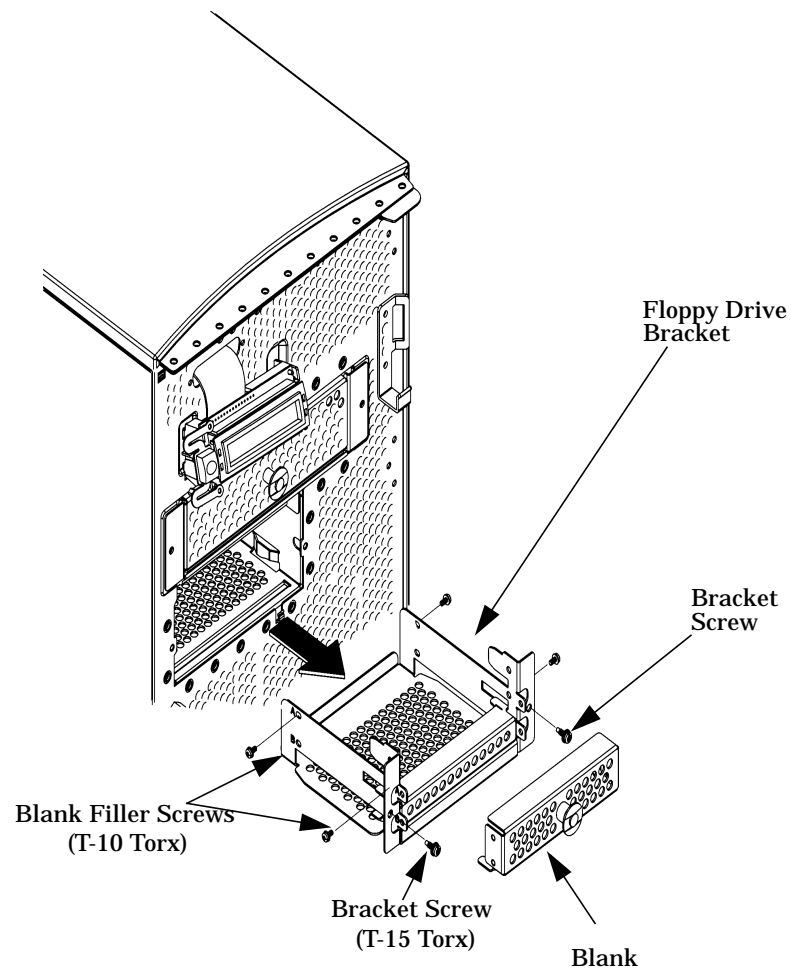
**Figure 4-3. Floppy Drive Bracket Assembly**

Figure 4-3. shows the Floppy Disk Drive Bracket Assembly for the B Class and C Class workstation.

**Figure 4-4. Hard Disk Drive Bracket Assembly**

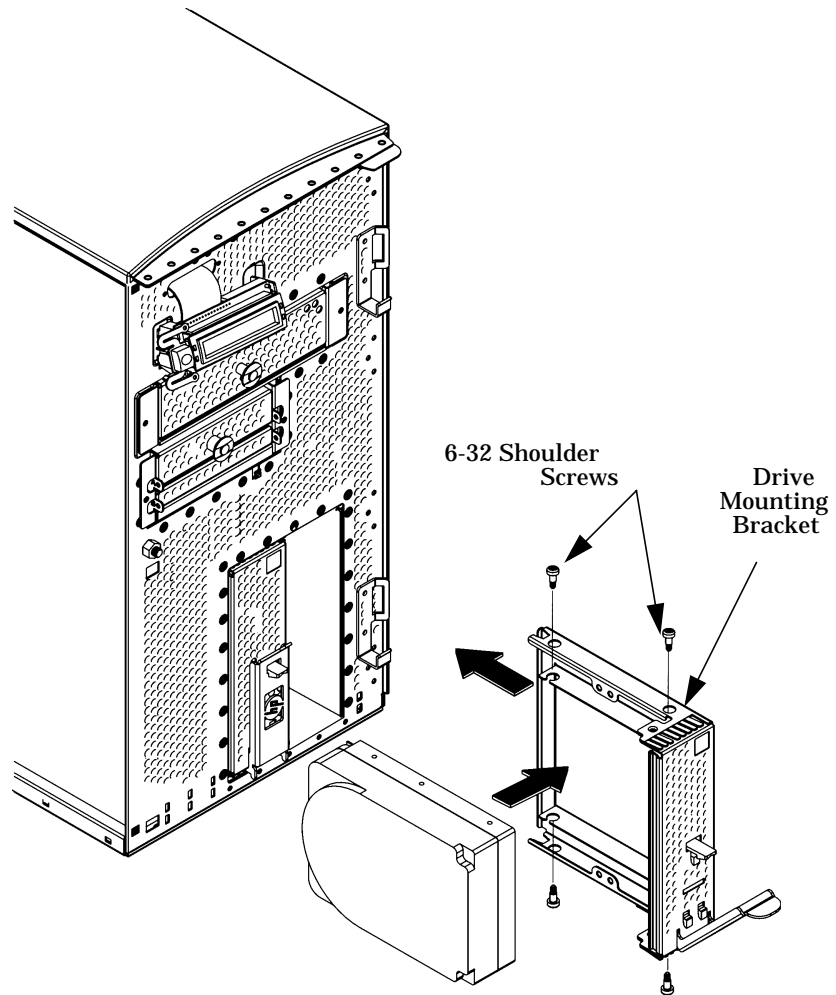


Figure 4-4 shows the Hard Disk Drive Bracket Assembly FRUs for the B Class and C Class workstation.

## Exchange and Non-exchange Part Numbers

In this chapter we refer to exchange and non-exchange part numbers.

You must return FRUs with exchange part numbers in exchange for a replacement FRU. Do *not* return FRUs with non-exchange part numbers—you may discard them.

Each of the B Class and C Class workstation exploded views show field replaceable units. Table 4-1 lists the exchange parts, and Table 4-2 lists the non-exchange parts in the B Class and C Class workstation.

**FRUs Part Numbers****Table 4-1. Exchange Parts FRU List**

Part Number	Description
A4986-69012	300MHz B1000 CPU Assembly
A4986-69014	400MHz C3000 CPU Assembly
A3862-69501	256 MByte SDRAM DIMM
A3860-69501	128 MByte SDRAM DIMM
A1658-69028	9GB 7200 RPM LVD Disk
A1658-69026	18GB 10K RPM Disk
A1658-69027	9GB 10K RPM Disk
A4986-69001	500W Power Supply

**Table 4-2. Non-exchange Parts FRU List**

Part Number	Description
A4986-66530	SCA Disk Backplane
D2035-60282	Floppy Drive
D4385-60001	32x ATAPI CD Drive
A4978-62005	SCA - drive bracket
A4978-62006	CD Drive bracket assembly
A4986-62006	Floppy Disk Drive bracket assembly
5063-4513	Speaker
A4978-62025	LCD/ Power Switch
A4978-62012	Fan- 92 mm
A4978-62013	Fan - 120 mm
A4978-68501	Fan - 80 mm - low profile
A4983-60401	USB Keyboard, United States
A4983-60101	USB Mouse, United States
A4986-63008	LVD SCSI Terminator
A1658-63012	NSE SCSI Terminator
A4986-40007	PCI Retainer Clip
A4986-62003	Front Bezel w/ CD Filler (blank)
A4986-63002	Cable - CD Signal
5182-1857	CD Audio Cable
A4986-63003	Cable - Ultra SCSI Signal
A4986-63004	Cable - Floppy Signal
A4986-63005	Floppy/CD ROM Power Cable
A4986-63006	LCD Signal Cable
A4978-62005	SCA Drive Bracket Assembly
A4986-62001	Main Chassis w/ keys, fans
A4986-00026	PCI Air Separator (Divider)
A4986-00039	Fan Bracket- Disk/Memory
0624-0727	Screw - 6-32 X 0.437 T-15 w/ slot
A4978-00039	6-32 Thumbscrew

**Table 4-2. Non-exchange Parts FRU List**

Part Number	Description
0624-0727	Screw - T-15 w/ slot
1826-4269	Real Time Clock Module (internal battery)



---

## FRU Removal and Replacement

The procedures in this section describe how to remove field replaceable units (FRUs). Observe any notices and prerequisites before removing a FRU. Replacement is the reverse of removal, unless noted.

Before performing these procedures, observe the following precautions:

**Step 1.** Power off the system, the monitor, and any peripheral devices.

---

<b>NOTE</b>	There is no need to manually shutdown the HP-UX operating system on the workstation before switching it off. When the front panel power switch is pressed to off, the workstation automatically shuts down the operating system before terminating the power. Wait for the system to completely shutdown and power off before disconnecting the power cord.
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<b>CAUTION</b>	Unplugging the power cord while HP-UX is running can damage the system files. Do <i>not</i> remove the left side panel before powering down the workstation. Remember that the left side panel is integral to the power supply safety interlock.
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**Step 2.** Unplug the workstation power cord and the power cord of any peripheral devices from AC wall outlets.

**Step 3.** Unplug the system unit power cord from the AC input connector.

**Step 4.** Disconnect any external cables from the connectors on the front and rear of the system unit.

**Step 5.** Attach a static-grounding wrist strap to your wrist and a location on the system chassis that is bare metal. Attach the sticky end of the wrist strap to bare metal on the rear panel of the workstation.

**Step 6.** Lay the workstation on a flat stable surface, such as a table top or floor. To protect against scratches, remove miscellaneous debris and preferably use an ESD mat to cushion the workstation.

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<b>CAUTION</b>	Follow normal ESD, anti-static precautions when handling the workstation or any of its components. Failure to do so can cause component degradation or failure.
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**Step 7.** If installed, remove any locking device from the security loop on the rear of the system unit. To access the storage media, the front panel security lock must be in the unlock position.

## System Unit Front Panel

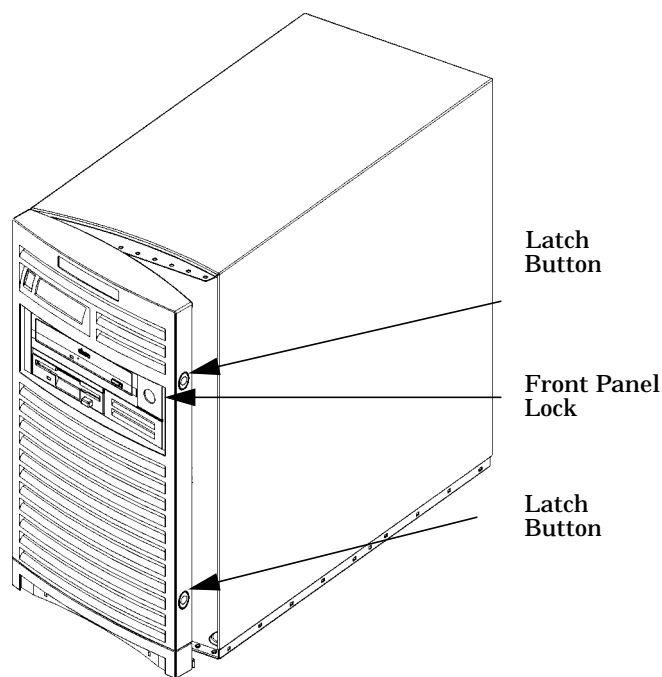
This section describes how to open and close the workstation front panel.

### Opening the System Unit Front Panel

Perform the following steps to open the system unit.

1. Power off the workstation, and unplug the power cord from the electrical outlet.
2. Attach the static-grounding wrist strap by following the instructions on the package. Attach the sticky end of the wrist strap to bare metal on the back panel of the system unit.
3. Unlock the front panel (also known as the front bezel) by pressing in on the two latch buttons located on the right side of the front panel. See Figure 4-5.

**Figure 4-5. Opening the Front Bezel**



4. Swing the panel clockwise on its left snap hinges until the panel comes free and place the front panel in a location to avoid damage.

### Closing the System Unit Front Panel

Perform the following steps to close the system unit.

1. Locate the snap hinges on the left side of the front panel, and insert them into the holes located along the left edge of the system unit.
2. Rotate the front panel counterclockwise until you hear the two latch buttons snap in place. The front panel is now closed. If there is a need to lock the front panel, use the system unit keys supplied with the system to lock the panel.

3. Plug in the system unit power cord, and power on the system.

### **Left Side Panel of the System Unit**

This section explains how to open and close the left side panel of the system unit. This side panel will have to be opened whenever you need access to the internal components of the workstation.

### **Opening the Left Side Panel of the System Unit**

Perform these steps to open the left side panel.

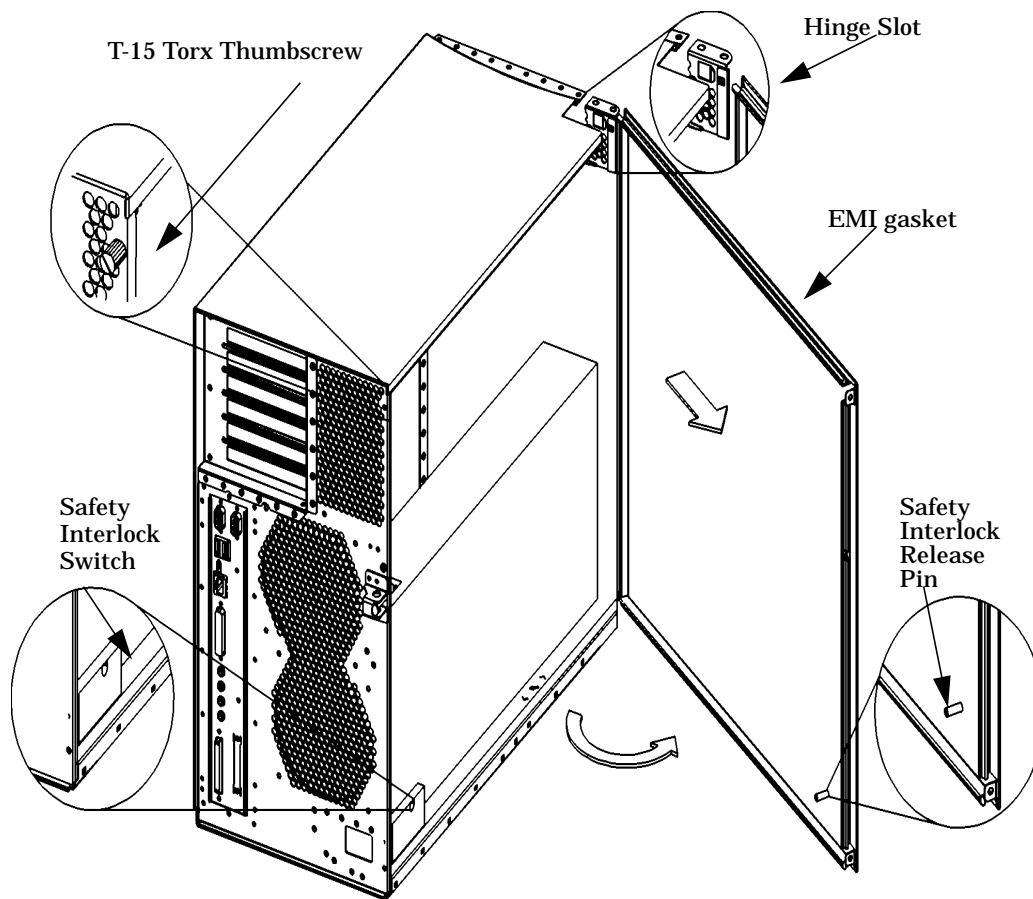
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<b>WARNING</b>	<b>If you remove the left side panel while the workstation is running, the safety interlock switch will power down the workstation. Be aware that cutting off power to the workstation via the safety interlock does not perform a clean shutdown of the workstation.</b>
----------------	---

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1. Turn the computer around so the rear is facing you. On the right edge of the computer, there are two thumbscrews with slotted T-15 Torx heads as shown in Figure 4-6. Remove the two thumbscrews.
2. Grasp the back edge of the left side panel and rotate it outward approximately 45 degrees to the computer. Next, pull the panel toward you as shown in Figure 4-6. This releases the panel's left side hook hinges from their hinge slots. See Figure 4-6.

**Figure 4-6. Opening the Left Side Panel of the System Unit**



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**NOTE** The EMI gasket, as shown in Figure 4-6, must not be removed from the side panel.

---

## Closing the Left Side Panel of the System Unit

Perform these steps to close the left side panel.

---

<b>NOTE</b>	Power supply thumbscrews must be fully tightened before closing the left side panel. Failure to tighten thumbscrews may damage the left side panel.
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1. Hold the left side panel so that the hook hinges can be inserted into their hinge slots. See Figure 4-6. Note that the hinge slots are located on the far right edge of the system unit (using the back of the system unit as the reference).
2. Swing the back edge of the panel toward the system unit's back edge and press the outside edges of the side panel tightly against the system unit. This will ensure a tight seal of the EMI gaskets.
3. Secure the side panel in place by screwing the top and bottom slotted T-15 Torx thumb screws into their brackets. The recommended torque setting is 6 inch-pounds.

## System Power Supply

This section will prove important to you as you begin to service the system. For example, you may need to install memory in the system unit. To do this, you need to position the power supply so you can access the memory slots. To remove the system board, you will need to remove the power supply. If the power supply fails, you will need to replace it with a new one. This section will help you accomplish these tasks.

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**WARNING** To prevent injury, unplug the workstation power cord from the electrical outlet before servicing any internal components.

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The topics covered in this section are:

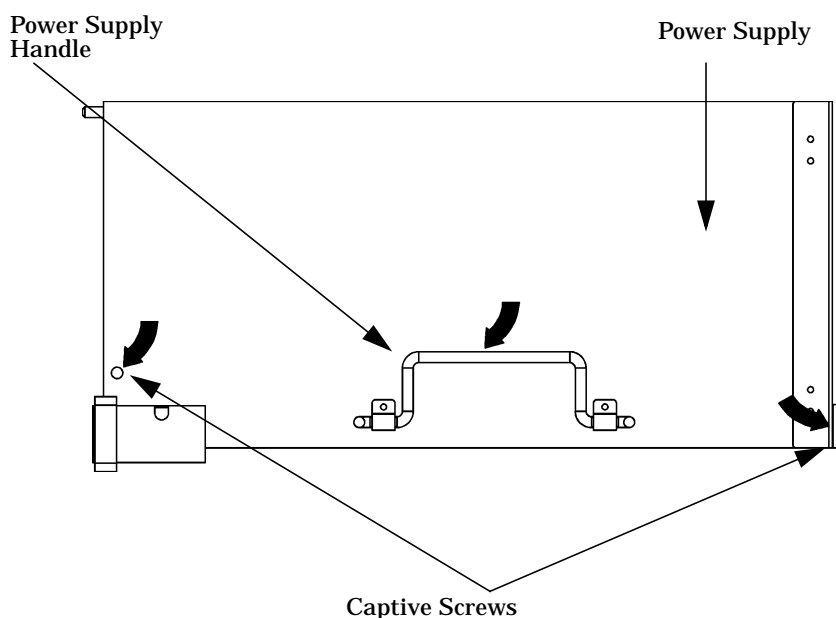
- Propping up the Power Supply
- Removing the Power Supply

### Propping Up the Power Supply

To prop the power supply up, follow these steps:

1. Lay the system on its side on a cushioned surface to protect against damage to the exterior workstation surfaces as shown in Figure 4-8.
2. Open the left side panel of the system unit by following the procedure in the section “Opening the Left Side Panel of the System Unit” in this chapter.
3. Unscrew the two screws on the power supply chassis as shown in Figure 4-7.

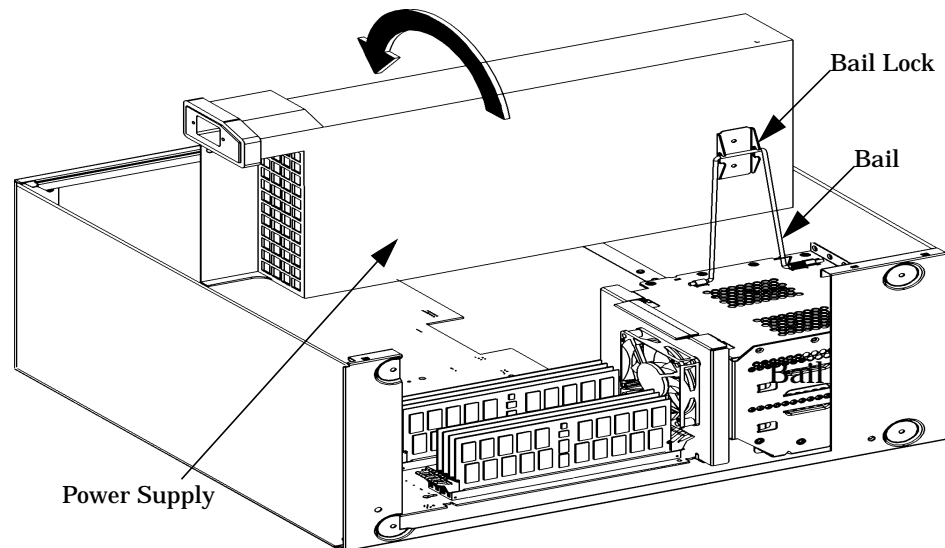
**Figure 4-7. Unscrewing the Power Supply Captive Screws**



4. Lift up on the power supply handle. The power supply bail automatically engages once

the power supply is propped in the upright position as shown in Figure 4-8. Note that the bail automatically springs into the bail lock to secure the power supply.

**Figure 4-8. Propping Up the Power Supply**



### **Closing the System**

Once you have completed the task you set out to perform, you are ready to close the system. To close the system follow these steps:

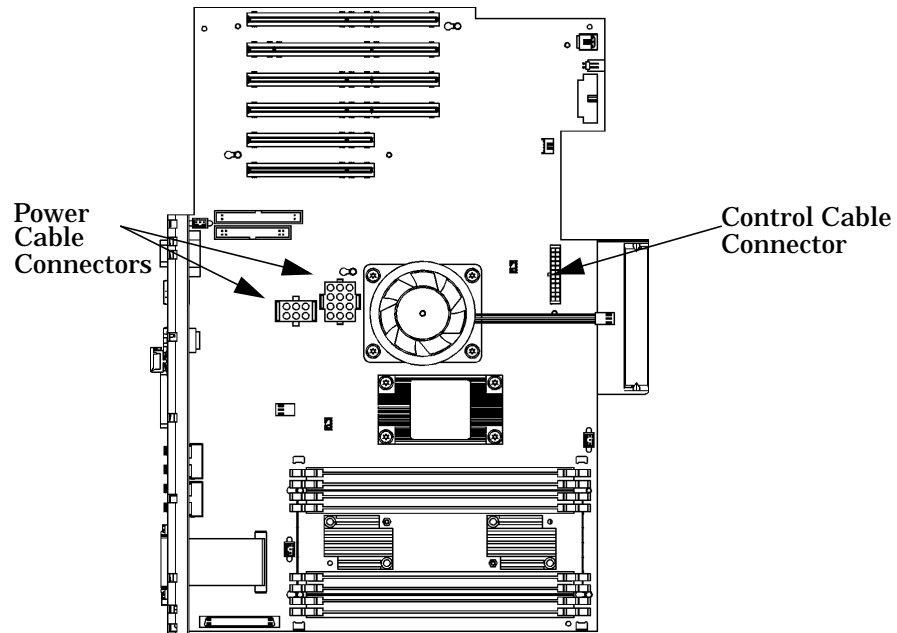
1. Push slightly back on the power supply until you are able to remove the bail from the bail lock. Using the power supply handle lower it downward into its original operating position. See Figure Figure 4-7.
2. Tighten both captive screws in place as seen in Figure 4-7.
3. Replace the left side panel of the system unit as shown in the section “Closing the Left Side Panel of the System Unit” in this chapter.

### **Removing the Power Supply**

To remove the power supply follow these steps:

1. Follow the steps covered in the section “Propping Up the Power Supply.”
2. Disconnect both power cables from the system board, the control cable, and the power cable for the SCA disk drives. See Figure 4-9. Note that these cables are keyed to prevent you from incorrectly plugging them in when you replace the power supply.

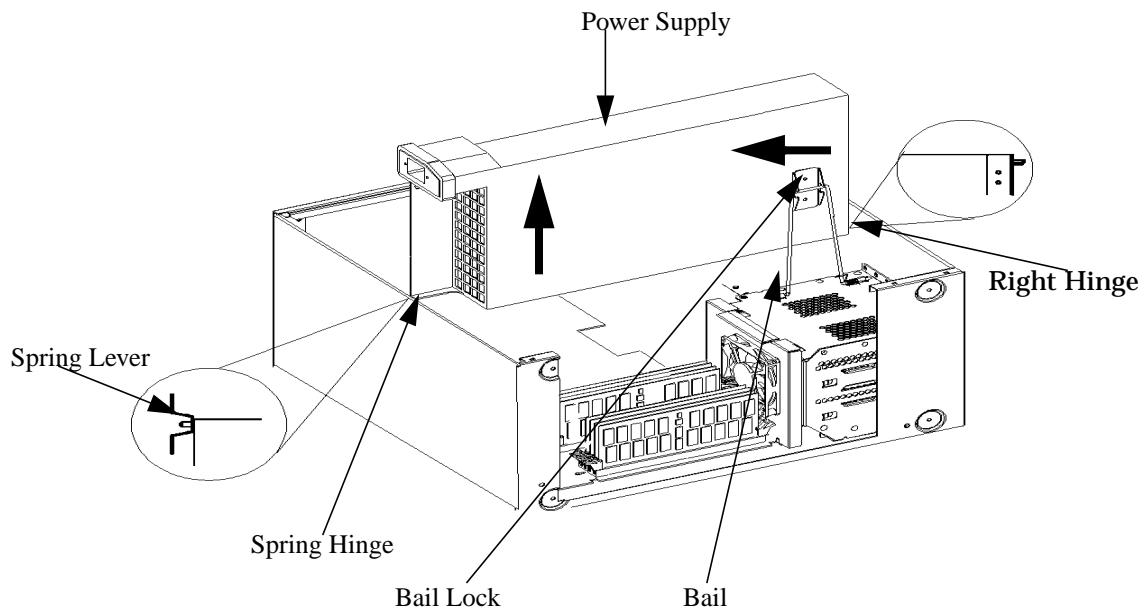
**Figure 4-9. Disconnecting the Power Supply Cables**



3. Remove the bail from the bail lock. See Figure 4-10.
4. Grasp the power supply by the handle and slide the spring hinge lever to the right and rotate it downward to lock it in place. See Figure 4-10. This allows you pull outward on the left side of the power supply while moving the power supply to the left as shown in Figure 4-10. The power supply should be free from its left spring hinge and right hinge. You can now remove the power supply from the system unit.



**Figure 4-10. Removing the Power Supply**



### **Closing the System**

Once you have completed the task you set out to perform, you are ready to close the system. To close the system follow these steps:

1. Pick up the power supply by its handle and slide the power supply pivot hole over the right side hinge pin.
2. Position the left end of the power supply in its proper location and release the hinge lever by lifting it up and allow the hinge pin to spring back into place. Adjust the angle of the power supply until the bail drops into the bail bracket. It will now remain in place.
3. Replace all power supply and sensor cables as shown in Figure 4-9. Make sure the cables are positioned so they will not be damaged by power supply movement.
4. Grab the handle of the power supply and lower it into its original operating position. See Figure 4-7.
5. Tighten both captive screws in place as seen in Figure 4-7.
6. Replace the left side panel to the system unit as shown in the section “Closing the Left Side Panel of the System Unit” in this chapter.

## I/O Cards

The B Class and C Class computer's PCI assembly has six slots. Slots 5 and 6 are half-size Peripheral Connect Interface (PCI) slots. Slots 1 through 4 are full-size PCI slots. See Figure 4-11 for a brief description of slot capabilities.

**Figure 4-11. PCI Card Slot Numbering and Capabilities**

SL1	64 Bit, 5.0V, 33MHz
SL2	Primary Graphics, 64 Bit, 3.3V, 66MHz
SL3	64 Bit, 5.0V, 33 MHz
SL4	Secondary Graphics, 64 Bit, 5.0V, 33 MHz
SL5	32 Bit, 5.0V, 33MHz
SL6	32 Bit, 5.0V, 33MHz

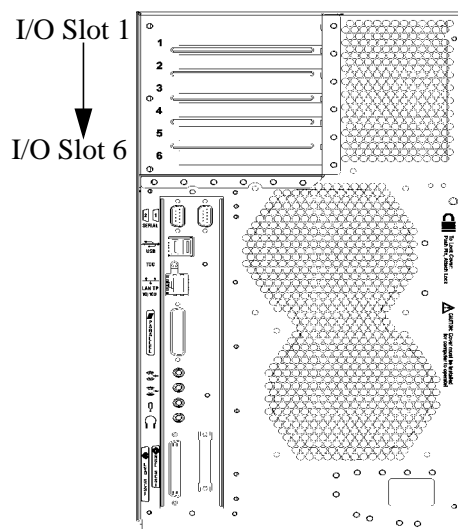
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**NOTE** To maintain good graphics performance, you should always use slot 2 (SL2) as the primary graphics card slot and slot 4 (SL4) as the secondary graphics card slot.

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The six I/O slots as seen from the back of the computer are labeled from top to bottom starting with one. See Figure 4-12.

**Figure 4-12. I/O Slot Numbering**



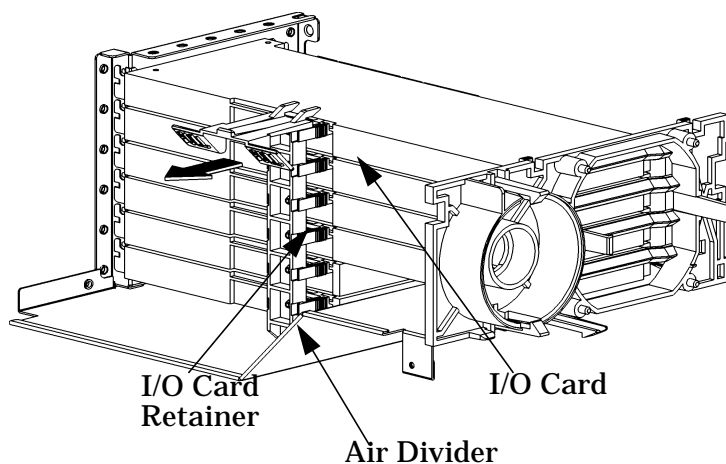
## Removing I/O Cards

This section assumes that you already have I/O cards loaded in the system unit, and you would like to remove them. You will need a T-15 Torx driver or a flat blade screw driver to remove the I/O slot bulkhead screws.

Here are the steps required for remove an I/O card from the system unit.

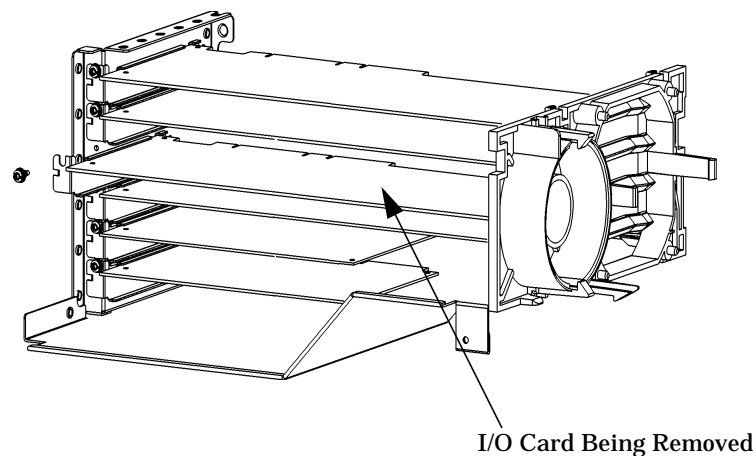
1. Open the side panel of the system unit as explained in the section “Opening the Left Side Panel of the System Unit” in this chapter.
2. Pull evenly in the direction of the arrow on both sides of the I/O card retainer to remove it. See Figure 4-13.

**Figure 4-13. Removing the I/O Card Retainer**



3. Locate the I/O card you want to remove and using a T-15 Torx driver or flat blade screw driver remove the I/O card's bulkhead screw as shown in Figure 4-14.

**Figure 4-14. Removing the I/O Card**



4. Pull evenly on the outside edges of the I/O card to remove it.

## Installing I/O Cards

To install a new I/O card, do the following:

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<b>NOTE</b>	Slots two and four are the graphics card slots. The primary graphics card slot is slot number two and the secondary graphics card slot is slot number four.
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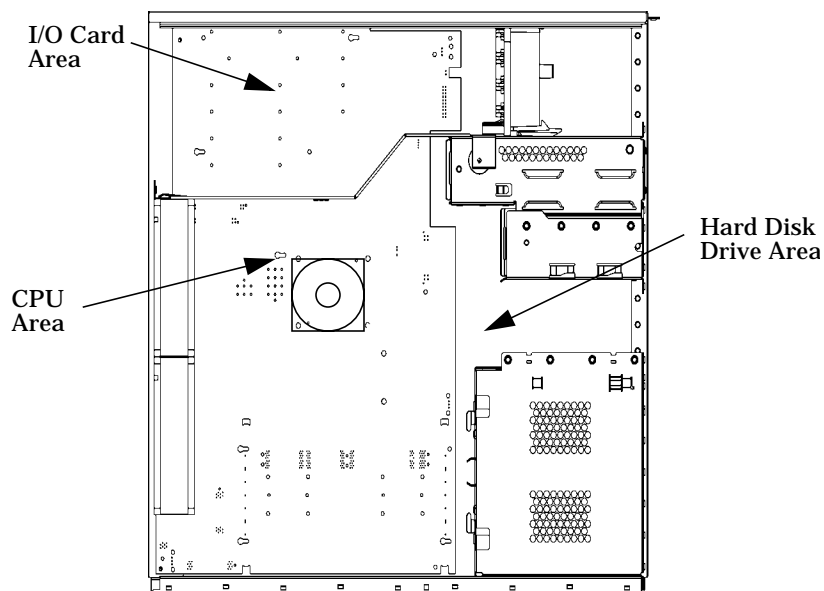
1. Open the left side panel of the system unit as explained in the section “Opening the Left Side Panel of the System Unit” in this chapter.
2. Locate the appropriate slot for the I/O card that is to be installed. See Figure 4-12.
3. Unscrew the T-15 Torx screw from the bulkhead blank of the slot you have chosen. If no blank is present, you may skip to step four.
4. Pull evenly in the direction of the arrow on both sides of the I/O card retainer to remove it. See Figure 4-13.
5. Insert the I/O card into the slot you have chosen with the bulkhead appropriately positioned. The ends of the card should be placed in the I/O card guides. Press firmly and evenly on the I/O card until it is in the connector. Screw the T-15 Torx screw into the I/O card’s bulkhead to secure the I/O card.
6. Replace the I/O card retainer by placing the bottom retainer clip in the slot on the air divider and the clips on the PULL tabs snap into their slots on the upper chassis.
7. Close the left side panel of the system unit by following the procedure in the section “Closing the Left Side Panel of the System Unit” in this chapter.

## System Unit Fans

The B Class and C Class has five fans that are used to cool various areas within the unit. If one of these fans is not working, you will need to replace it to ensure no heat damage is caused to the system unit. To replace a bad fan, you will need to follow one of three sets of procedures that are covered in this section. The three procedures are:

- Removing the fan from the hard disk drive area
- Removing the fans from the CPU area
- Removing the fan and speaker from the I/O card area.

**Figure 4-15. Fan Cooling Areas for the System Unit**



## Removing the Fan from the Hard Disk Drive Area

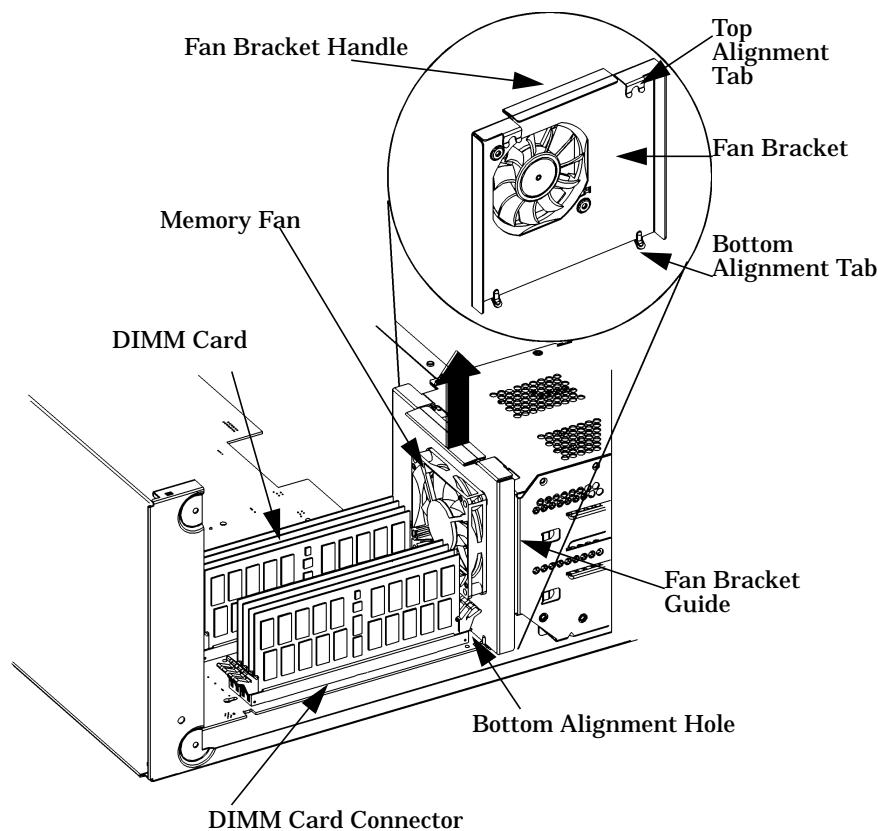
This section provides the procedure for removing the cooling fan from the back of the hard disk drive chassis. You will need to remove this fan when it needs replacement and when you need to access or remove the:

- SCA disk interface board
- System board
- DIMM cards

Here are the steps necessary for removing the fan from the hard disk drive chassis.

1. Remove the system unit's side panel. See the section "Opening the Left Side Panel of the System Unit" in this chapter.
2. Lay the system unit on its right side (determined by facing the workstation front panel), and prop up the power supply. See the section "Propping Up the Power Supply" in this chapter.
3. Unplug the fan power cable from the system board. If you are removing the hard disk drive fan to access the memory cards, you do not need to unplug the fan's power cable.
4. Lift up on the handle of the fan bracket to remove the fan. See Figure 4-16. As you lift up on the fan bracket, the top alignment tabs will be removed from their hard disk drive alignment screws, and the bottom alignment tabs will be removed from their holes allowing the fan to be removed. Once the hard disk drive fan is removed, place it on top of the hard disk drive chassis.

**Figure 4-16. Removing the Fan from the Hard Disk Drive Chassis**



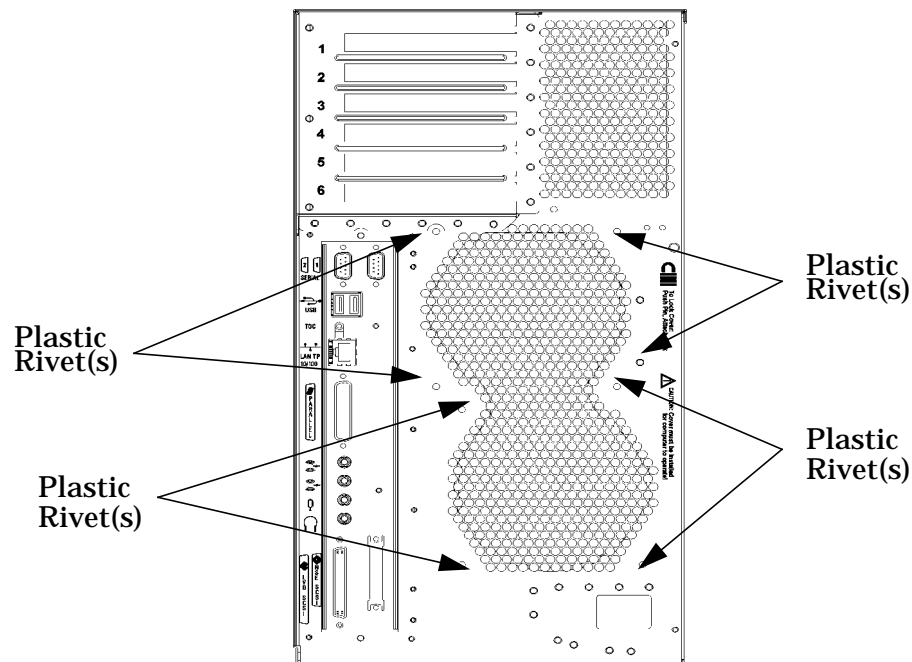
### Removing the Fans from the CPU Area

This section provides the procedure for removing the cooling fans from the CPU area of the system unit's chassis. You will need to remove these fans when they need replacement or repair and when you need to remove the system board.

Here are the steps necessary for removing the fans from the CPU area of the system unit's chassis.

1. Remove the system units left side panel. See the section "Opening the Left Side Panel of the System Unit" in this chapter.
2. Lay the system unit on its right side (determined by facing the system units front panel), and remove the power supply. See the section "Removing the Power Supply" in this chapter.
3. Unplug the power cables for the fans as shown in Figure 4-18., and position yourself so you are facing the back of the system unit. See Figure 4-17.

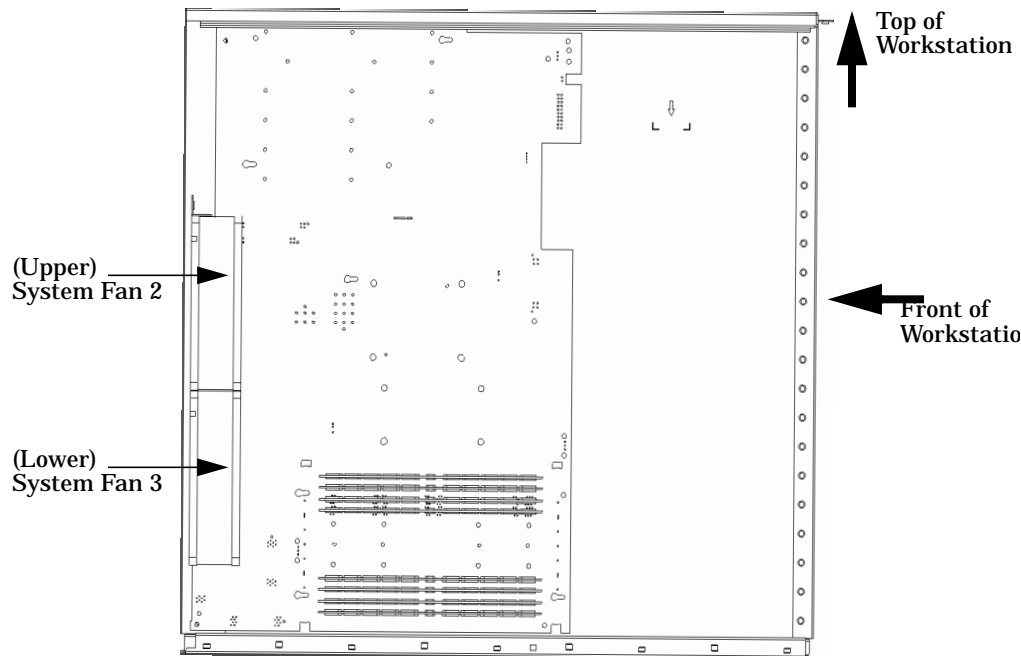
**Figure 4-17. Removing the Fan Rivets**



4. Remove the plastic mounting rivets that hold the fans in place. See Figure 4-17. To remove the rivets, press in on the backside of the rivet to release the fastener. If the rivet backside is inaccessible, use a sharp edged device to remove the rivet from the face of the rear panel. Also, while removing the rivets, you will need to reach inside the system unit and hold on to the fan you are removing. If you are removing the top fan, hold on to the fan and pull outward as shown by the arrow in Figure 4-18. If you are removing the lower fan, you will need to hold both edges of the fan and slide it to the right. See arrow one in Figure 4-18. Next pull outward on the fan. See arrow two in Figure 4-18.



**Figure 4-18. Removing CPU Area Fans**



Note that you can replace the fans using the original rivets; however, the plastic rivets will be slightly deformed. If you would like new rivets to replace the old ones, new rivets for mounting the fans are supplied in the replacement kit.

### **Installing the Fans for the CPU Area**

To replace the system board fans, do the following:

#### **Installing the Bottom Fan**

1. Position the bottom fan so its power cable channel is against the system unit chassis, and the power cable channel as you face the fan is in the lower right corner.
2. Slide the lower left corner of the fan into the fan support. See Figure 4-15.
3. Line up the rivet holes of the fan with the rivet holes of the system unit chassis.
4. Press the plastic rivets into place. See Figure 4-17.
5. Plug the fan power cable into its connector on the system board. See Figure 4-18.

#### **Installing the Top Fan**

1. Position the top fan so its power cable channel is up against the workstation chassis, and the power cable channel as you face the fan is in the upper right corner.
2. Line up the rivet holes of the fan with the rivet holes of the system unit chassis.
3. Press the plastic rivets into place. See Figure 4-17.
4. Plug the fan power cable into its connector on the system board. See Figure 4-18.

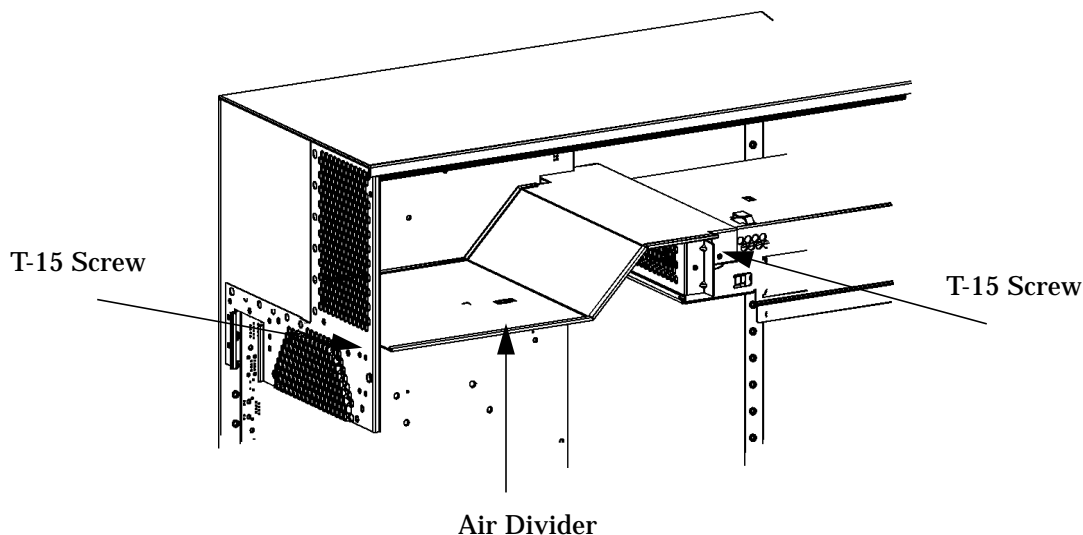
## Removing the Fan and Speaker from the I/O Card Area

The I/O area of the system unit has its own cooling fan. Note that there is a speaker attached to the same mounting bracket as the fan. This section explains how to remove the fan and speaker if they are defective.

To remove the I/O cooling fan or speaker, do the following:

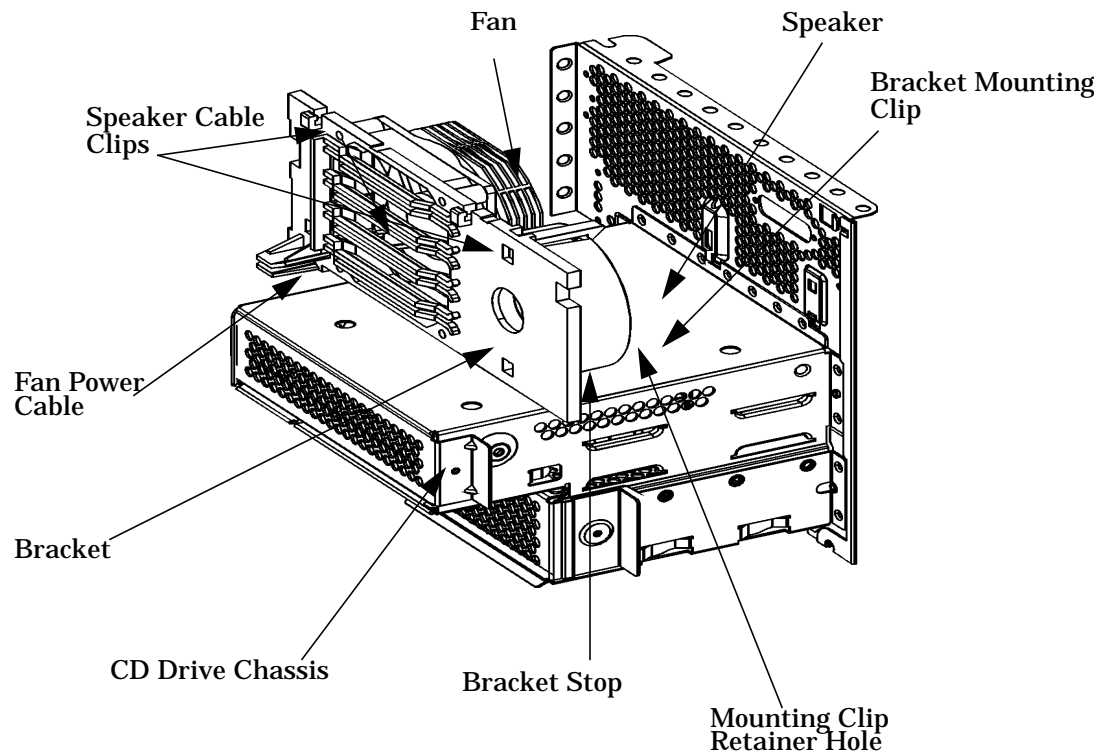
1. Remove the workstation left side panel. See the section “Opening the Left Side Panel of the System” in this chapter.
2. Lay the workstation on its side, and remove all of the I/O cards. See the section “Removing I/O Cards” in this chapter.
3. Remove the system unit air divider as shown in Figure 4-19 by unscrewing the two T-15 Torx screws, which hold it in place. Next grasp the edge of the air divider and pull it towards you.

**Figure 4-19. Removing the System Unit Air Divider**



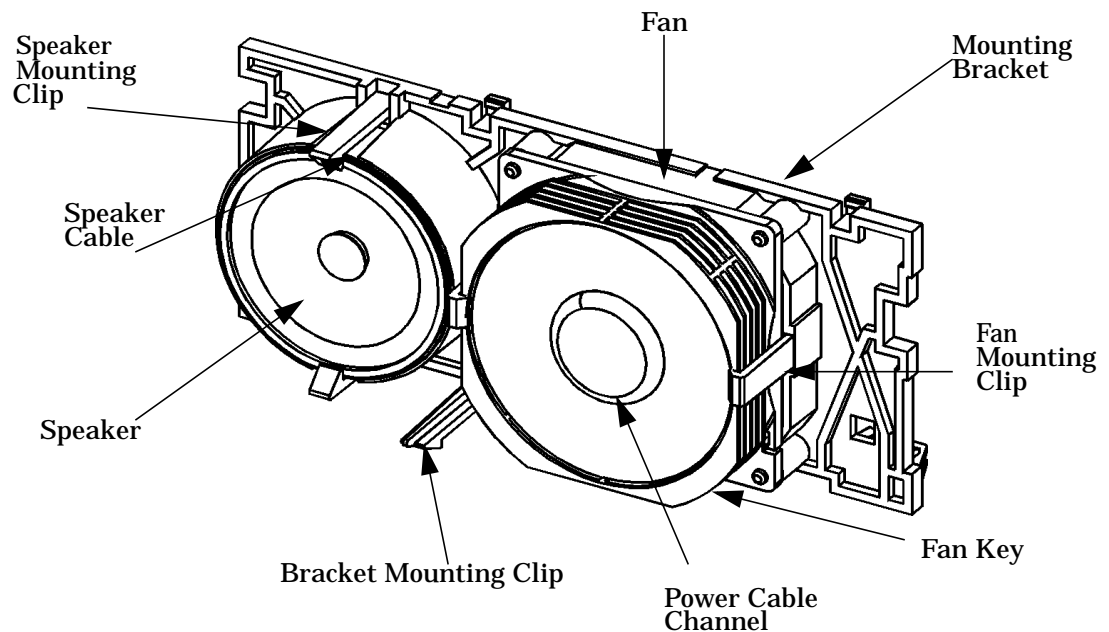
4. Remove the fan and speaker cables from the system board and lift up on the bracket mounting clip. See arrow in Figure 4-20. Next grab hold of the fan and speaker bracket and rotate it about 15 degrees to the left. See the arrow in Figure 4-20. The fan and speaker bracket should now be free of the clip retainer hole and the bracket stop. Now move the whole mounting bracket to the left or toward the back of the CD Drive chassis. The fan and speaker mounting bracket is now free of the system unit.

**Figure 4-20. Removing the Fan and Speaker from the I/O Area**



5. To remove the speaker from the mounting bracket, push a finger through the access hole and spread the two retaining clips. The speaker will pop free of the mounting clips.

**Figure 4-21. Removing the Fan and Speaker from the Bracket**



6. Remove the fan from the bracket by slightly pulling the left and right fan mounting clips away from the fan, and then pulling outward in the direction of the arrow. See Figure 4-21.

### **Installing a Fan or Speaker in the I/O Card Area**

If you are replacing a fan or speaker in the I/O card area, follow the steps covered in this section.

1. Remove the fan or speaker from the I/O card area by following the procedure in the section “Removing the Fan and Speaker from the I/O Card Area” in this chapter.
2. Install the fan by positioning the fan power cable channel so that it is located in the lower right corner of the fan and speaker mounting bracket. See Figure 4-20. Note that the power cable channel must be positioned against the mounting bracket. Once you have the fan in the correct position, pull outward on the fan mounting clips and put the fan in place. Then release the mounting clips so that they hold the fan on the mounting bracket.
3. Install the speaker by positioning it so that the speaker cable can be easily run out of the hole in the back of the mounting bracket. See Figure 4-20. Note that the speaker cable must be held in place on the backside of the mounting bracket by the speaker cable clips as shown in Figure 4-20. Once you have the speaker in the correct position, pull outward on the speaker mounting clips and put the speaker in place. Then release the mounting clips so that they hold the speaker on the mounting bracket.
4. Replace the fan/speaker bracket in the chassis by inserting the bottom and in first between the system board and the CD cage. Insert the edge into the slots provided and then rotate it into place until the mounting clip snaps into place. See Figure 4-20. on page 115.
5. Position the fan power cable, speaker cable and LCD ribbon cable so that they run along the system board side of the computer chassis. See Figure 4-20. Dress the cables so that they are free from damage by other system components.
6. Place the air divider into its proper position as shown in Figure 4-19., and screw the T-15 Torx screws into place.
7. Replace all I/O cards into their proper slots as explained in the section “I/O Cards” in this chapter.
8. Close the system unit as discussed in the section “Closing the System Unit” in this chapter.

## Removable Media Devices

There are only two removable media devices allowed in a B Class and C Class computer:

- CD Drive
- 3.5-inch floppy disk drive.

The procedures provided in the subsequent sections explain how to install and remove media devices.

### Installing a CD Drive

Install the CD drive by following the procedure covered in this section.

---

**WARNING**     **Turn the workstation off and unplug the power cord before installing the CD drive.**

---

Note you will have to verify that the master/slave/CSEL jumper is set in the CSEL position. Since different manufacturers of CD drives have different locations for the CSEL jumper, look at the documentation that comes with the CD drive for the proper location of this jumper.

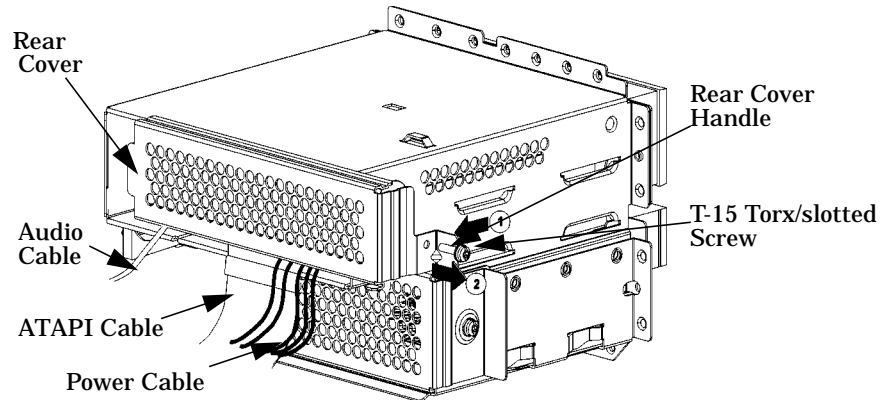
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**CAUTION**     CD drives are susceptible to mechanical and electronic shock. When handling the drive, always wear the static-grounding wrist strap that came in the CD drive kit. Always handle the drive carefully.

---

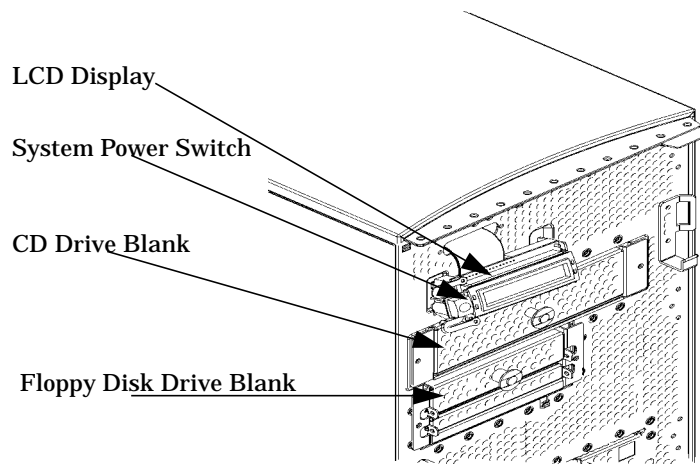
1. Perform the procedures in the sections “Opening the System Unit Front Panel” and “Opening the Left Side Panel of the System Unit.” The front panel must be open to insert the CD drive into its proper location in the chassis. The left side panel must be open to access the CD drive ATAPI connector and its power connector.
2. Remove the CD Drive rear cover by unscrewing the T-15 Torx screw as shown in Figure 4-22. Note that the CD drive’s rear cover is located on the rear of the removable media chassis inside the workstation. Push the cover handle away from the rear of the removable media chassis approximately one inch. Next pull the cover handle toward you. The ATAPI data cable, CD audio cable and power cable are now accessible to you.

**Figure 4-22. Removing the CD Drive Rear Cover**



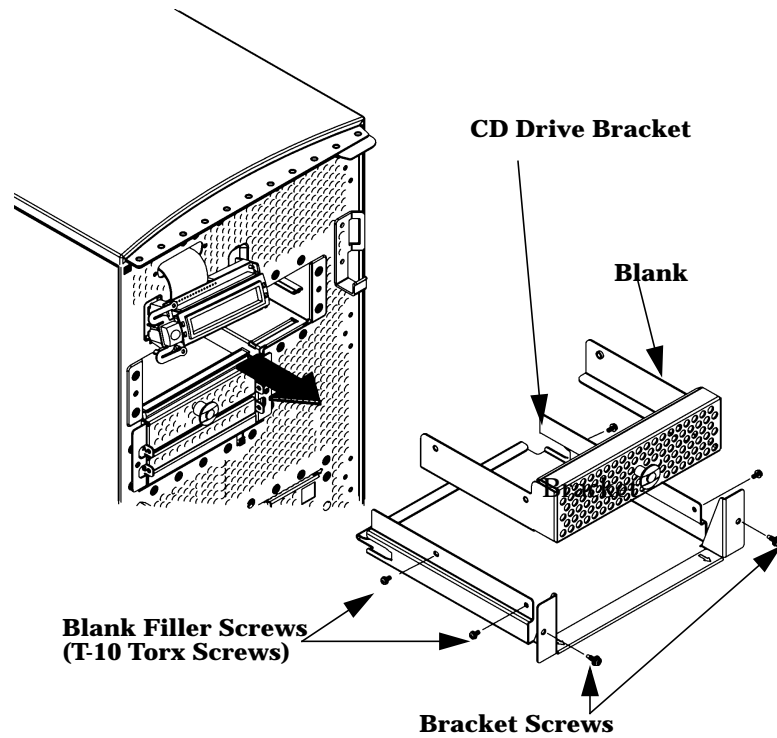
3. Rotate the system unit around until you see the front of the unit as shown in Figure 4-23.

**Figure 4-23. Front of System Unit with the Front Panel Removed**



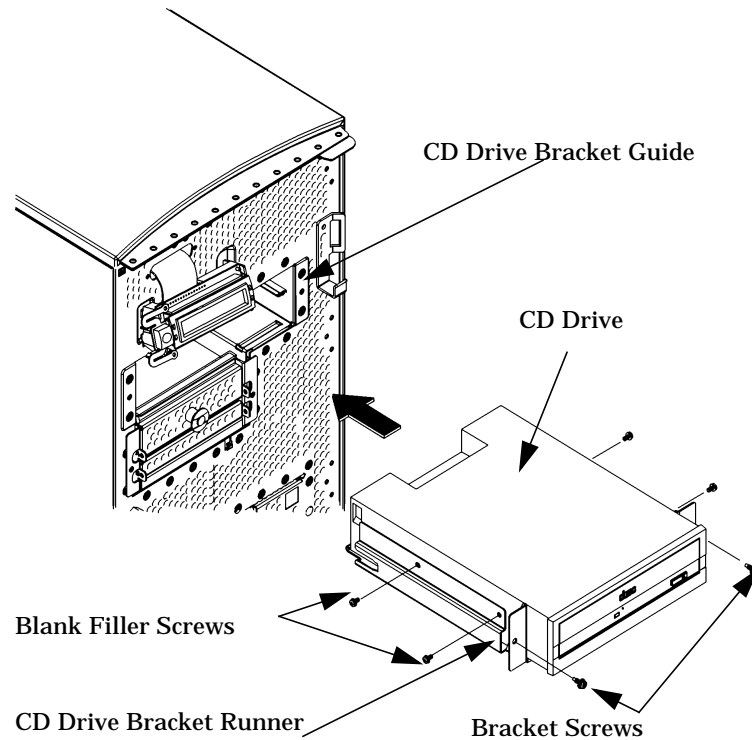
4. Remove both CD Drive bracket screws (T-15 Torx screws) and pull the CD Drive bracket out of the chassis assembly as shown in Figure 4-24. Next remove the four CD Drive blank screws (T-10 Torx screws) as shown in Figure 4-24, and remove the blank from the bracket. You are now ready to mount the CD Drive into the CD Drive bracket.

**Figure 4-24. Removing the CD Drive Bracket and Blank**



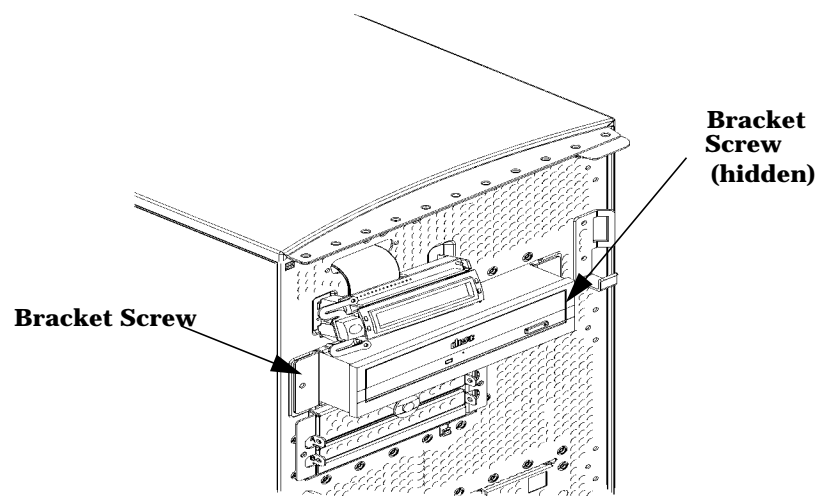
5. Read the CAUTION statement at the beginning of this section. Next remove the CD Drive from its shipping container, and using the four T-10 screws mount the disk drive to the bracket as shown in Figure 4-24.

**Figure 4-25. Installing the CD Drive**



6. Slide the CD Drive and its bracket into the system unit chassis as shown in Figure 4-25. There are runners on the side of each bracket and guides inside the CD Drive chassis that will help the assembly to slide into place.
7. Tighten the two CD Drive bracket screws as shown in Figure 4-26.

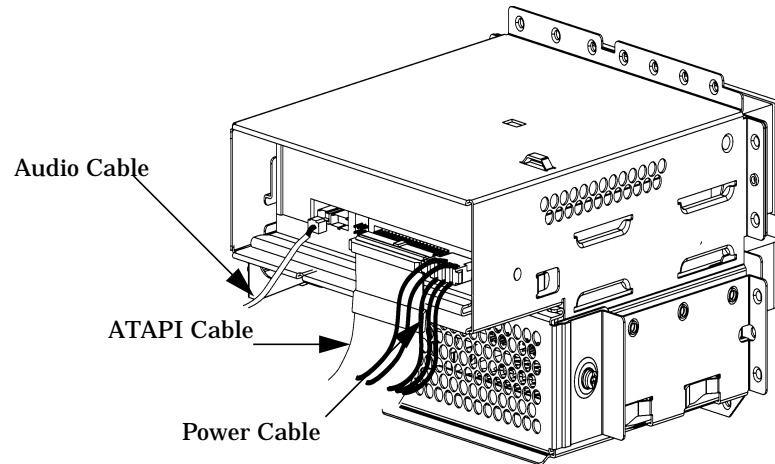
**Figure 4-26. Tightening the Bracket Screws**



8. Plug the ATAPI and power cables into their appropriate connectors. Note that the connectors are keyed for proper insertion. See Figure 4-27.

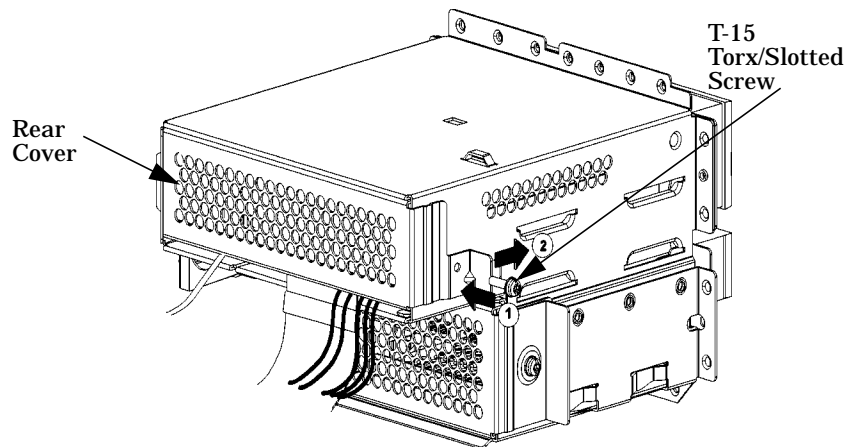


**Figure 4-27. Plugging in the ATAPI and Power Cables**



9. Make sure that the ATAPI and power cables are positioned so that they come out of the bottom edge of the rear CD Drive cover. This edge is rounded to prevent cutting of the cables. See Figure 4-28. Next tighten the T-15 Torx screw.

**Figure 4-28. Replacing the Rear EMI CD Drive Cover**



10. Complete the installation of the CD Drive by replacing the front and side panels of the system unit. You should also make sure that all cables are positioned within the system unit so that they do not hang loosely. This prevents damage to the cables.

### Removing a CD Drive

This section explains how to remove a CD Drive from your system unit.

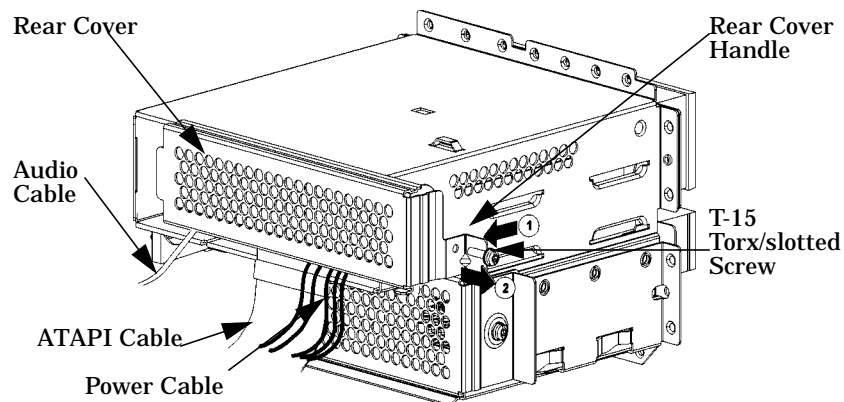
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**CAUTION** CD Drives are susceptible to mechanical and electronic shock. When handling the drive, always wear the static-grounding wrist strap that came in the CD Drive kit. Always handle the drive carefully.

---

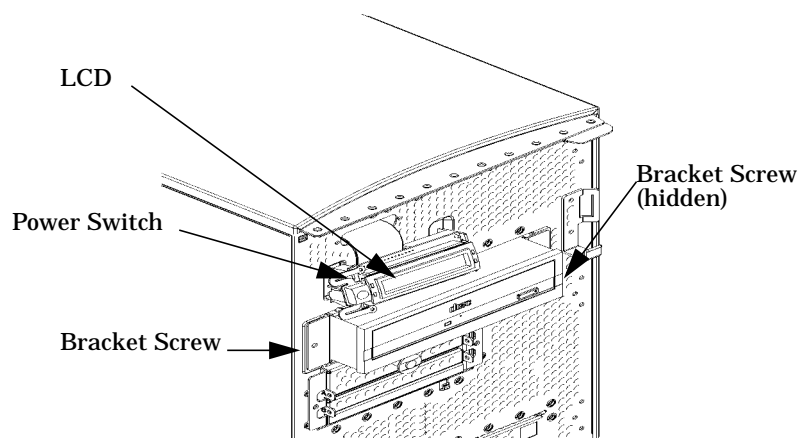
1. Perform the procedures in the sections “Opening the System Unit Front Panel” and “Opening the Left Side Panel of the System Unit.” The front panel must be open to remove the CD Drive from the system chassis. The left side panel needs to be opened so you can get to the CD Drive’s ATAPI connector and its power connector.
2. Remove the CD Drive rear disk cover by unscrewing the T-15 Torx screw as shown in Figure 4-29. Note that the CD Drive’s rear cover is located on the back of the removable media chassis inside the system unit. Push the cover handle away from the back of the removable media chassis approximately one inch. Next pull the cover handle toward you. The ATAPI and power cables are now accessible to you. Disconnect these cables from the CD Drive.

**Figure 4-29. Removing the CD Drive’s Rear Cover**



3. Rotate the system unit around until you see the front of the unit as shown in Figure 4-30.

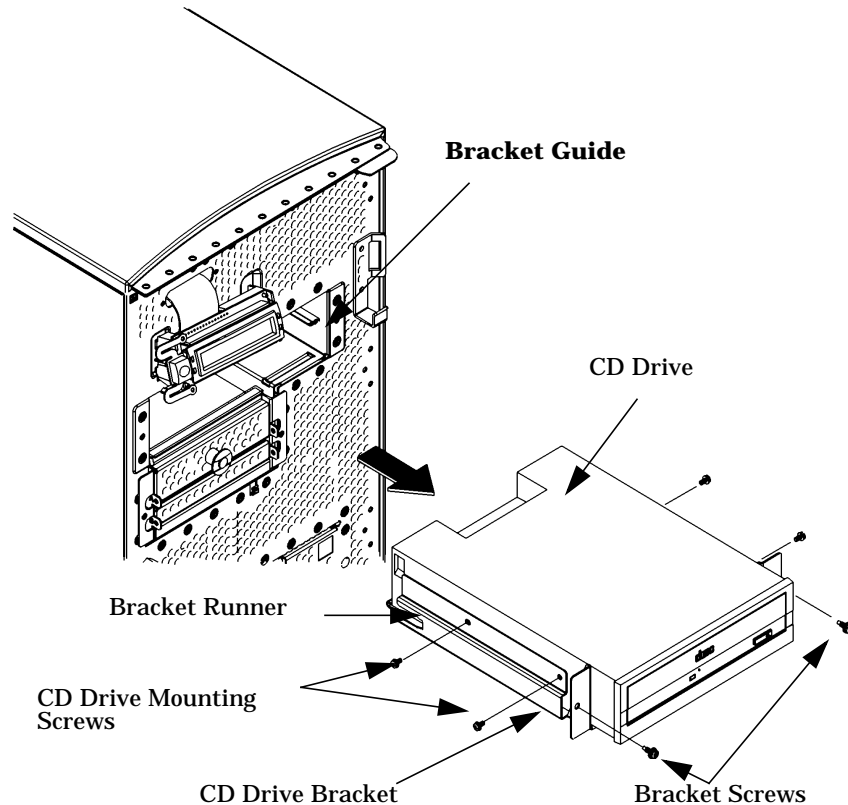
**Figure 4-30. Front of the System Unit with the Front Panel Removed**



4. Remove both CD Drive bracket screws (T-15 Torx screws) and pull the CD Drive out of the chassis assembly as shown in Figure 4-31. Next remove the four CD Drive

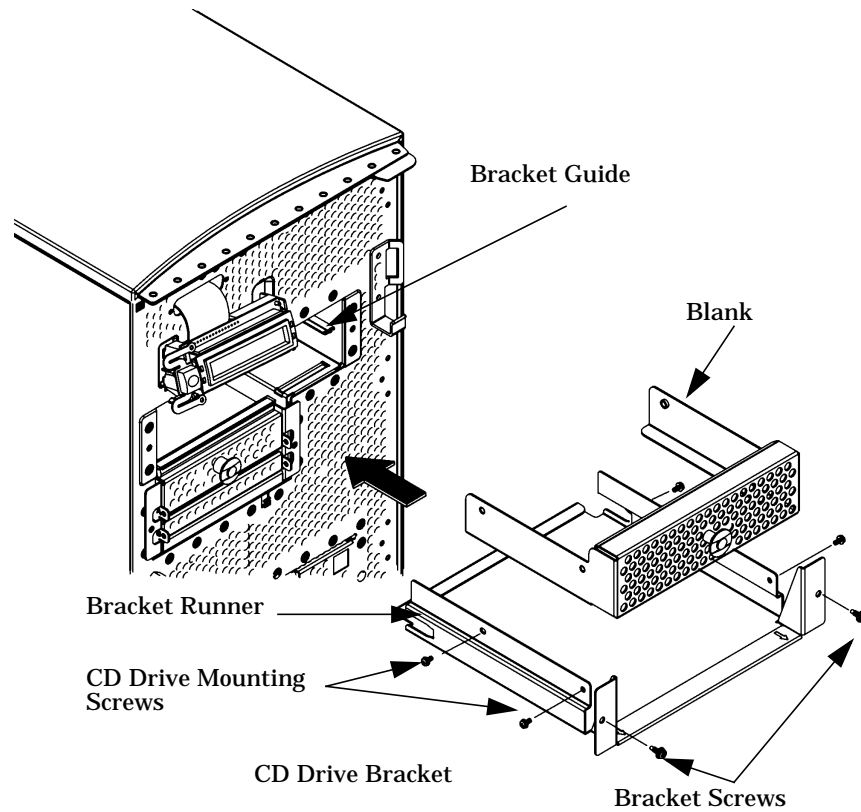
mounting screws (T-10 Torx screws) as shown in Figure 4-31 and remove the CD Drive from the bracket. You are now ready to attach the CD Drive blank to the CD Drive bracket.

**Figure 4-31. Removing the CD Drive**



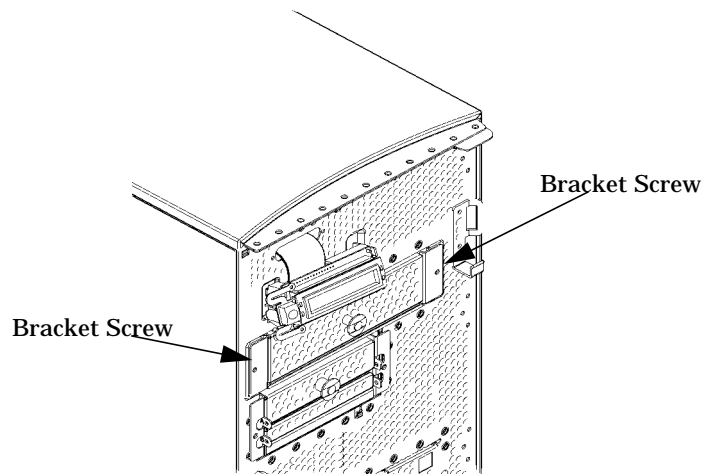
5. Insert the CD Drive blank in the CD Drive bracket and tighten the four CD Drive mounting screws to secure the blank. Align the bracket runners and bracket guides and slide the CD Drive blank and bracket into place. See Figure 4-32.

**Figure 4-32. Installing the CD Drive Blank**



6. Tighten the two CD Drive bracket screws as shown in Figure 4-33.

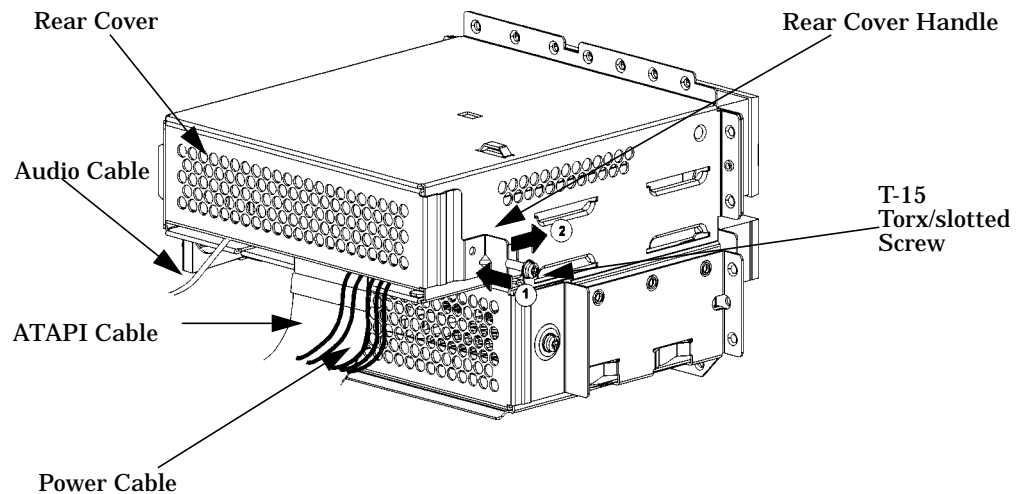
**Figure 4-33. Tightening the Bracket Screws**



7. Place the ATAPI cable and power cables inside the CD Drive chassis, and position the cables so that they go under the bottom edge of the CD Drive's rear cover. The rear

cover's edge is rounded to keep you from cutting the cables. Figure 4-34. Next, place the end opposite the rear cover handle into the cover slot and tighten the T-15 Torx screw to secure the rear cover. You have now completed the removal of the CD Drive.

**Figure 4-34. Replacing the CD Drive Rear Cover**



### Installing a Floppy Disk Drive

Install the floppy disk drive by following the procedure covered in this section. Note there are no jumper settings required for the installation of the floppy disk drive.

---

**WARNING**     **Turn the workstation off and unplug the power cord before installing the floppy disk drive.**

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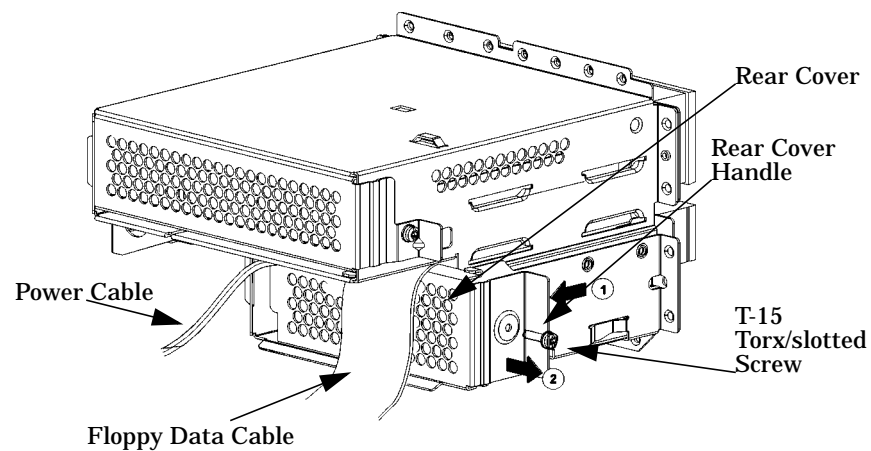
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**CAUTION**     Floppy disk drives are susceptible to mechanical and electronic shock. When handling the drive, always wear the static-grounding wrist strap that came in the Floppy disk drive kit. Always handle the drive carefully.

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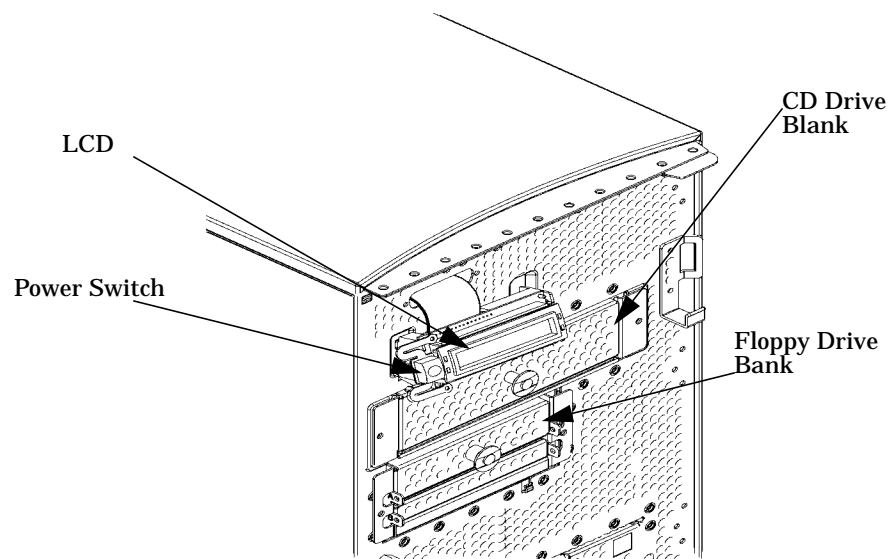
1. Perform the procedures in the sections “Opening the System Unit Front Panel” and “Opening the Left Side Panel of the System Unit.” The front panel needs to be opened so you can insert the floppy disk drive into its proper location in the chassis. The left side panel needs to be opened to access the floppy’s data connector and its power connector.
2. Remove the floppy rear-disk cover by unscrewing the T-15 Torx screw as shown in Figure 4-35. Note that the floppy’s rear cover is located on the rear of the removable media chassis inside the system unit. Push the cover handle away from the rear of the removable media chassis approximately one inch. Next pull the cover handle toward you. The data and power cables are now accessible to you.

**Figure 4-35. Removing the Floppy Disk's Rear Cover**



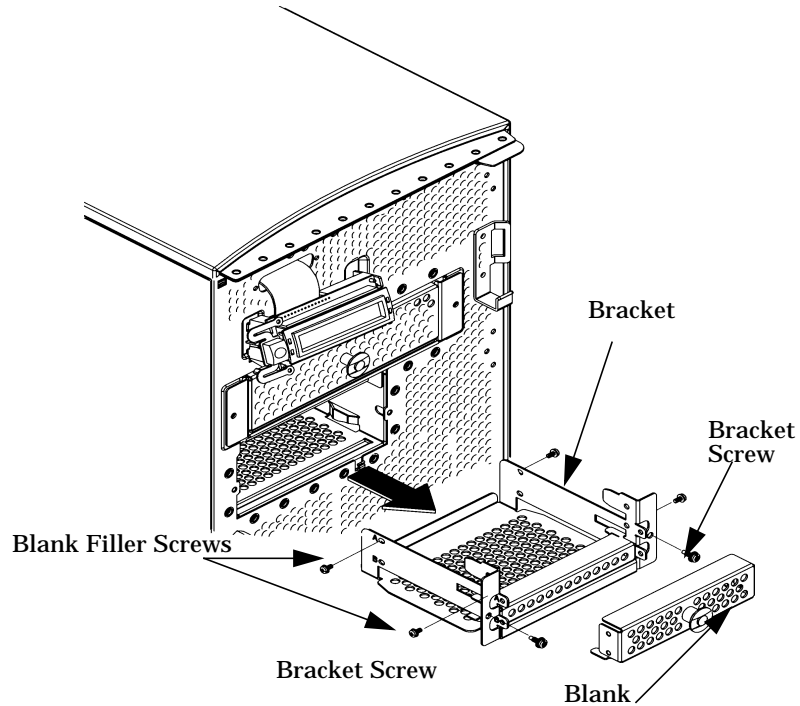
3. Rotate the system unit around until you see the front of the workstation as shown in Figure 4-36.

**Figure 4-36. Front of Workstation with the Front Panel Removed**



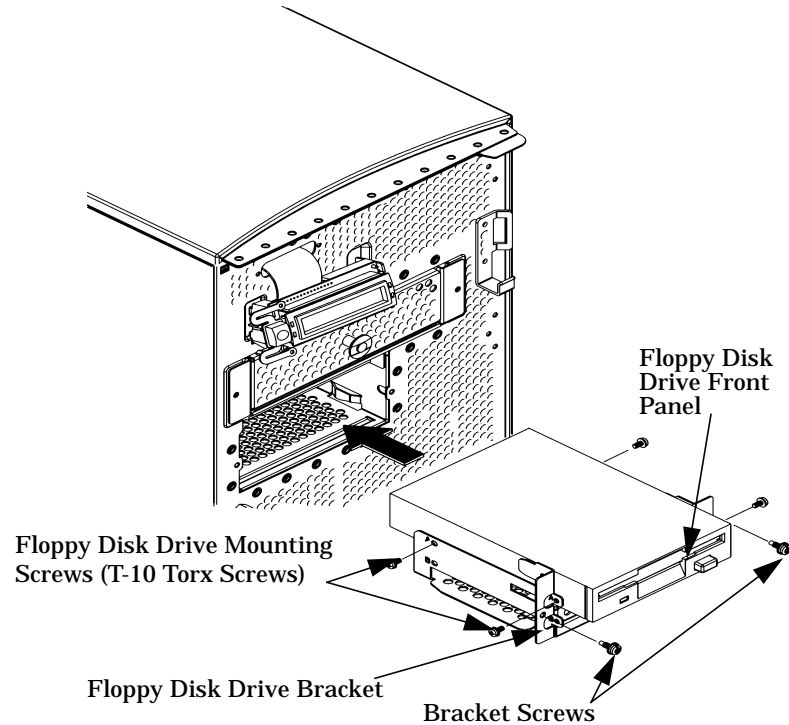
4. Remove both floppy disk bracket screws (T-15 Torx screws) and pull the floppy disk bracket out of the chassis assembly as shown in Figure 4-37. Next remove the four floppy disk blank screws (T-10 Torx screws) as shown in Figure 4-37. and remove the blank from the bracket. You are now ready to mount the floppy disk drive into the floppy disk bracket.

**Figure 4-37. Removing the Floppy Disk Bracket and Blank**



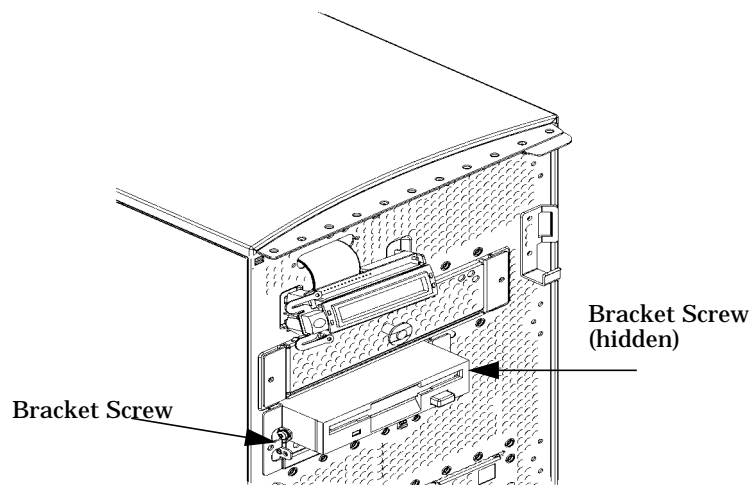
5. Read the CAUTION statement at the beginning of this section. Next remove the floppy disk drive from its shipping container, and using the four T-10 blank screws mount the disk drive to the bracket as shown in Figure 4-38.

**Figure 4-38. Installing the Floppy Disk Drive**



6. Slide the floppy disk and its bracket into the system unit chassis as shown in Figure 4-38.
7. Tighten the two floppy bracket screws as shown in Figure 4-39.

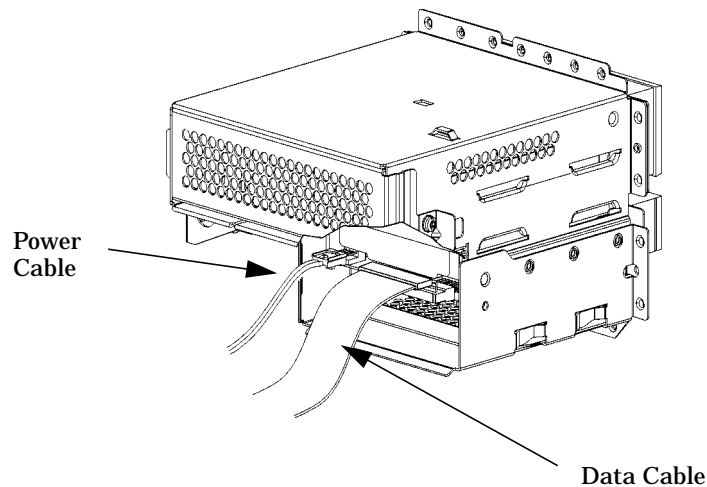
**Figure 4-39. Tightening the Bracket Screws**



8. Plug the data and power cables into their appropriate connectors. Note that the connectors are keyed for proper insertion. See Figure 4-40.

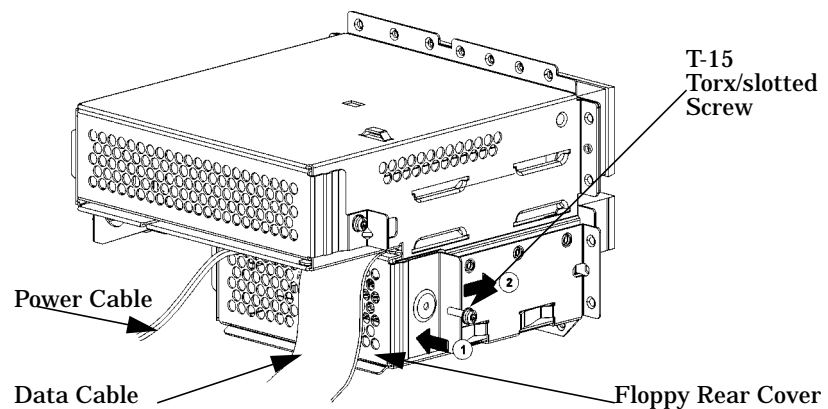


**Figure 4-40. Plugging in the Data and Power Cables**



9. Verify that the data and power cables are positioned to come out of the top edge of the rear floppy cover. This edge is rounded to prevent cutting of the cables. See Figure 4-41. Next tighten the T-15 rear cover screw.

**Figure 4-41. Replacing the Rear Floppy Cover**



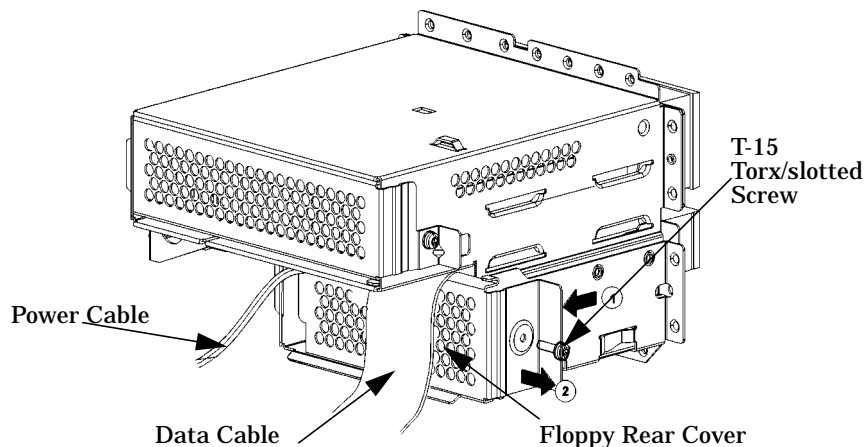
10. Complete the installation of the floppy disk drive by replacing the front and side panels of the system unit. You should also make sure that all cables are positioned within the system unit so that they do not hang loosely. This will prevent damage to the cables.

### **Removing a Floppy Disk Drive**

1. Perform the procedures in the sections “Opening the System Unit Front Panel” and “Opening the Left Side Panel of the System Unit.” The front panel needs to be opened so you can remove the floppy disk drive from the system unit chassis. The left side panel needs to be opened so you can get to the floppy’s data connector and its power connector.

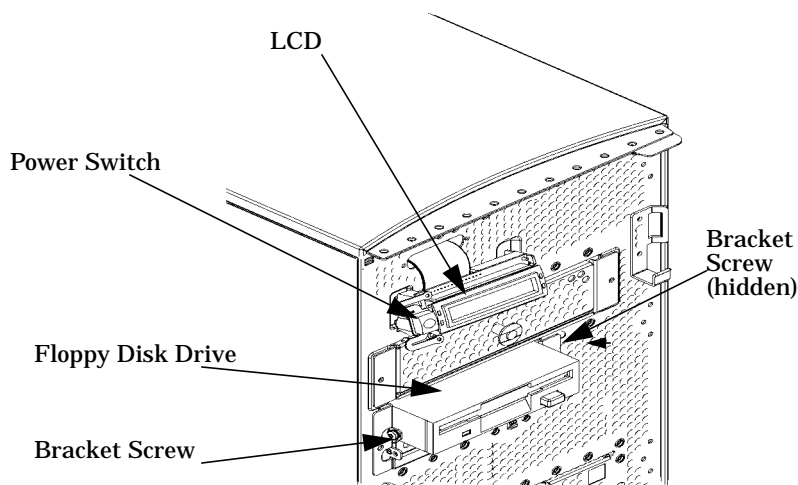
2. Remove the floppy rear disk cover by unscrewing the T-15 Torx screw as shown in Figure 4-42. Note that the floppy's rear cover is located on the rear of the removable media chassis inside the system unit. Push the cover handle away from the rear of the removable media chassis approximately one inch. Next pull the cover handle toward you. Remove the data and power cables from their connectors.

**Figure 4-42. Removing the Floppy Disk's Rear Cover**



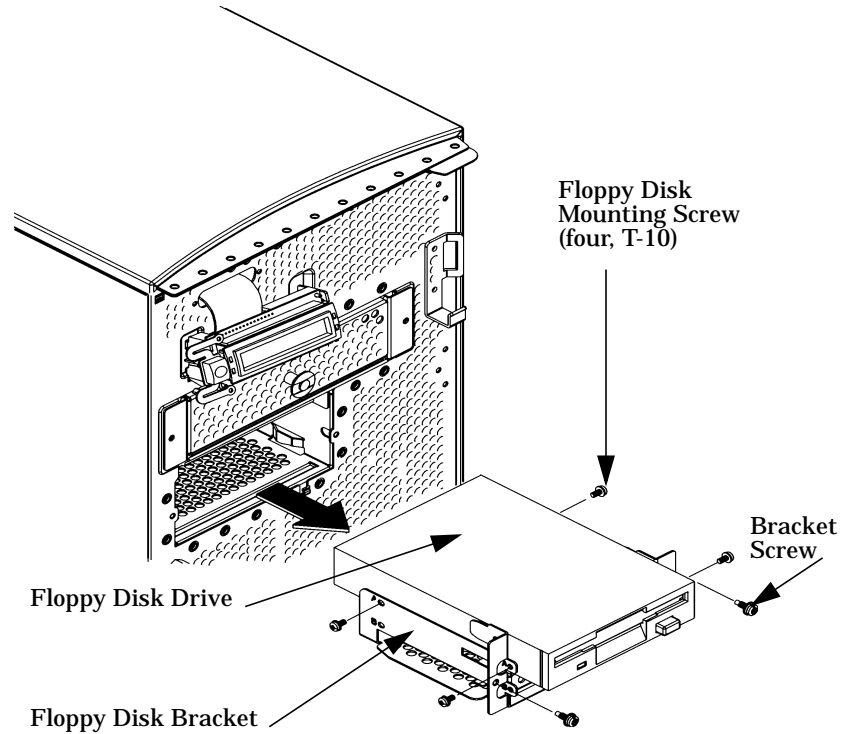
3. Rotate the workstation around until you can see the front of the unit as shown in Figure 4-43..

**Figure 4-43. Front of Workstation with the Front Panel Removed**



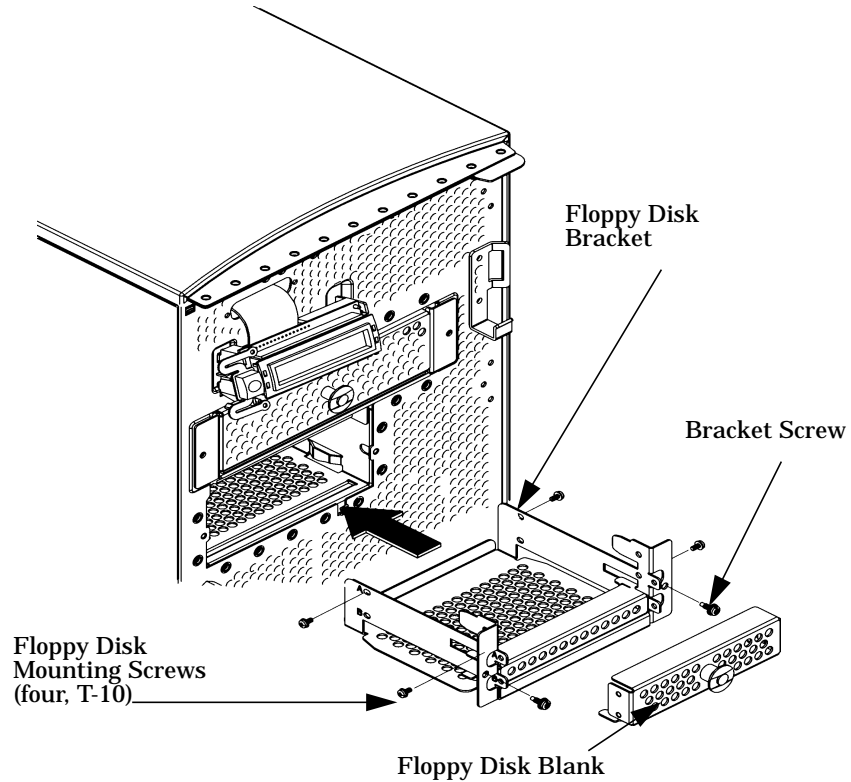
4. Remove both floppy disk bracket screws (T-15 torx screws) and pull the floppy disk drive out of the chassis assembly as shown in Figure 4-43. Next remove the four floppy disk mounting screws (T-10 torx screws) as shown in Figure 4-44 and remove the floppy disk drive from the bracket. You are now ready to attach the floppy disk drive blank to the floppy disk bracket.

**Figure 4-44. Removing the Floppy Disk Drive**



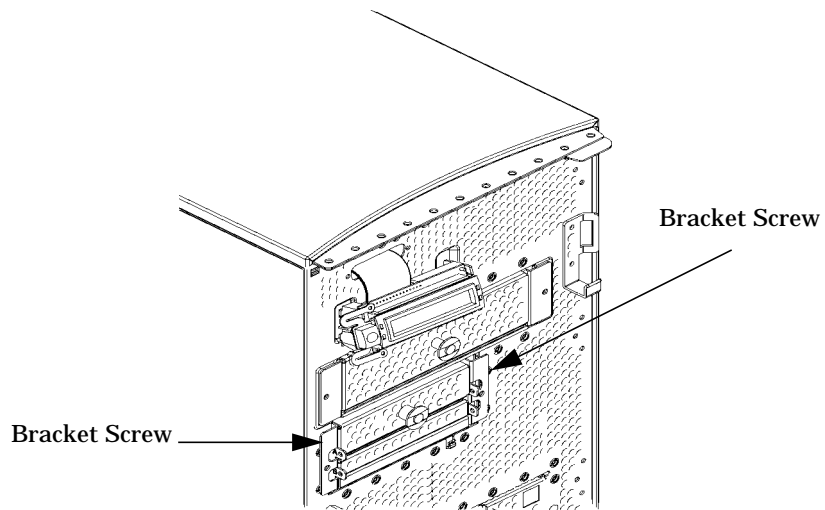
5. Place the floppy disk blank in the floppy disk bracket and insert the four floppy disk mounting screws into the bracket and tighten them. See Figure 4-45.

**Figure 4-45. Installing the Floppy Disk Blank and Bracket**



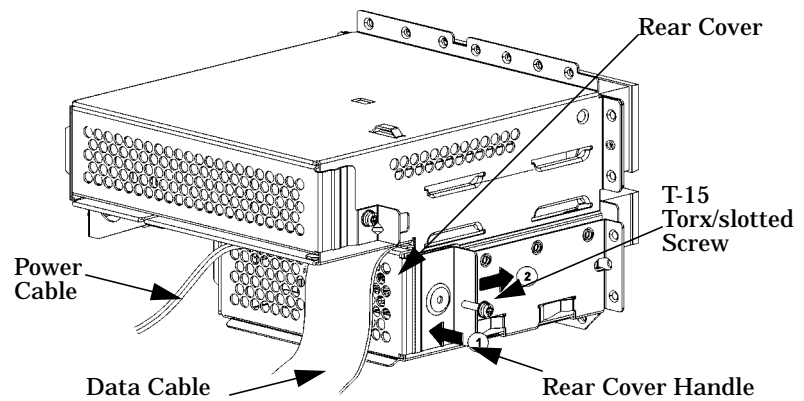
6. Slide the floppy disk blank and its bracket into the system unit chassis as shown in Figure 4-45.
7. Tighten the two floppy disk bracket screws as shown in Figure 4-46..

**Figure 4-46. Tightening the Bracket Screws**



8. Inspect and verify that the data and power cables are positioned to come out of the top edge of the rear floppy cover. This edge is rounded to prevent cutting of the cables. See Figure 4-47. Put the rear cover in place and tighten the T-15 rear cover screw.

**Figure 4-47. Replacing the Rear Floppy Cover**



9. Complete the installation of the floppy disk drive by replacing the front and side panels of the system unit. Verify that all cables are positioned properly within the workstation to avoid damage to the cables.

## Hard Disk Drive

This section describes installation and removal of hard disk drives in the B Class and C Class workstation. The first subsection details how to install a hard drive, the second subsection details how to remove a hard disk drive and the final subsection describes how to configure the hard disk after it is installed.

The B Class and C Class workstations may have a maximum of two hard drives. The hard drive that came with the workstation was set to SCSI ID 6. If adding a second hard disk drive, the second hard disk drive will use SCSI ID 5. Note that the two slots for the hard disk drives have SCSI ID numbers 5 and 6 preassigned to them. You will not be able to change the SCSI ID numbers.

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<b>NOTE</b>	Do not use SCSI ID 7 for any of the internal or external disk drives. The host SCSI controller uses SCSI ID 7.
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### Installing a Hard Disk Drive

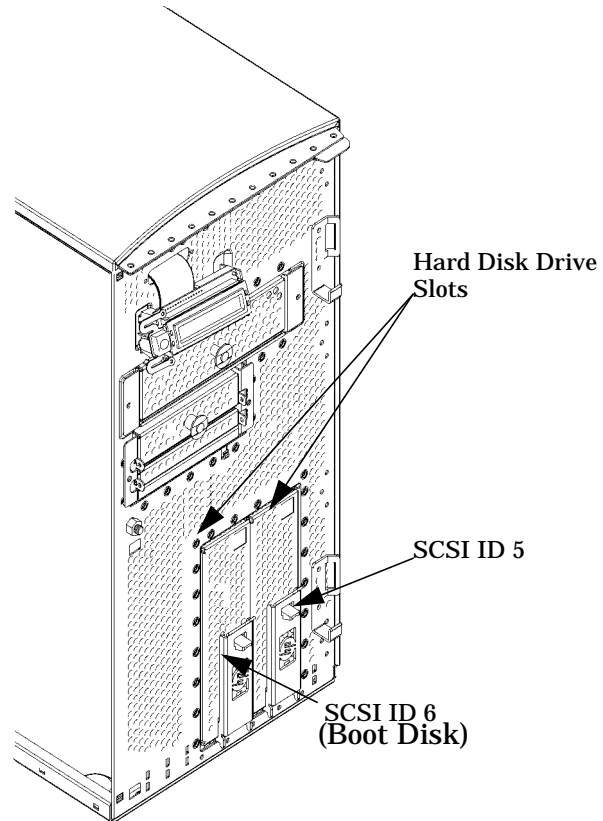
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<b>NOTE</b>	If you are installing a new hard disk drive, the slotted pan screws for attaching the drive in the carrier are stored on the carrier rails. Also, see the section titled “Hard Disk Drive Configuration” in Chapter 2 in this manual.
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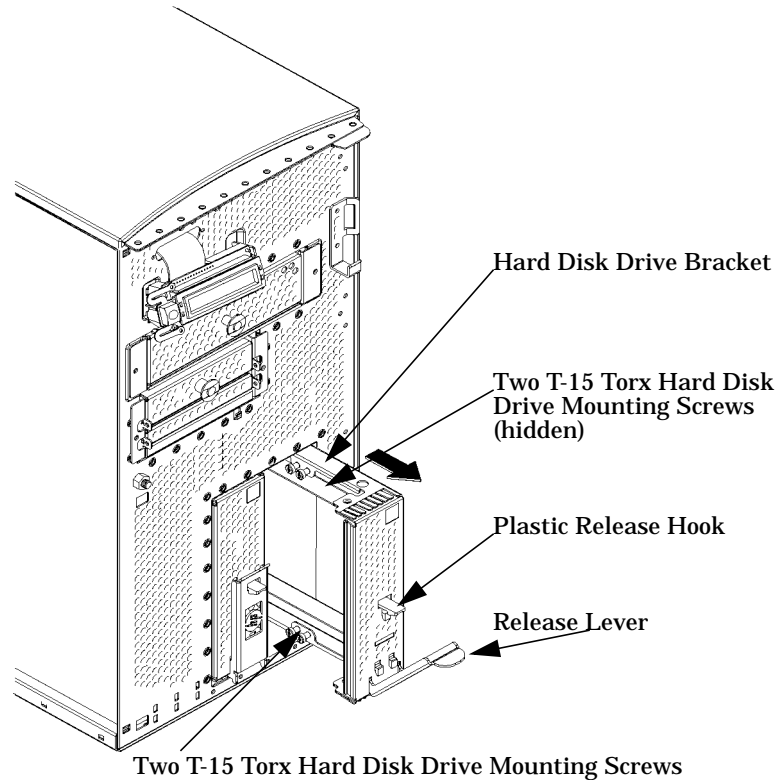
1. Open the front panel of the workstation, refer to the section “Opening the System Unit Front Panel.” In the front lower-right corner of the workstation, there are two hard drive slots. The slot on the far right is the one discussed in this section. See Figure 4-48.

**Figure 4-48. The Hard Drive Slots**



2. Open the hard drive slot by pressing the plastic release hook upward and pulling outward on the release lever as shown in Figure 4-49. As you pull outward on the release lever the hard drive bracket will easily slide out of the slot.

**Figure 4-49. Removing the Hard Drive Bracket**



3. Mount the hard disk drive on the hard drive bracket using the four T-10 torx screws and rubber mounting grommets as shown in Figure 4-50. Next, slide the assembly into its hard drive slot, and push inward on the release lever until the front of the hard drive bracket is flush with the system unit. To verify a good connection with the SCA hard disk interface (backplane board) connector, press firmly around the corners of the hard drive bracket.

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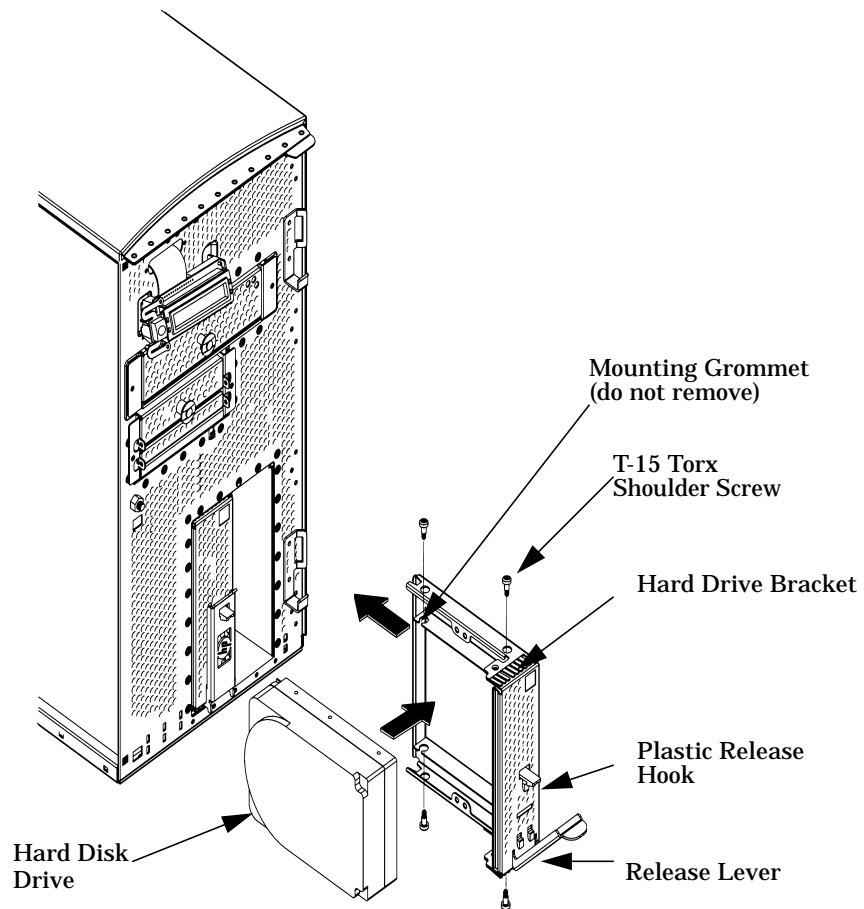
**NOTE** If you are installing a hard disk drive, you will need to mount it and create a file system on it. This should be done after you have installed the hard disk drive.

To mount a hard disk drive and create a file system on it use the procedure in the section “Adding a Hard Disk Drive as a File System Using SAM” found in this chapter.

---



**Figure 4-50. Inserting the Hard Disk Drive**

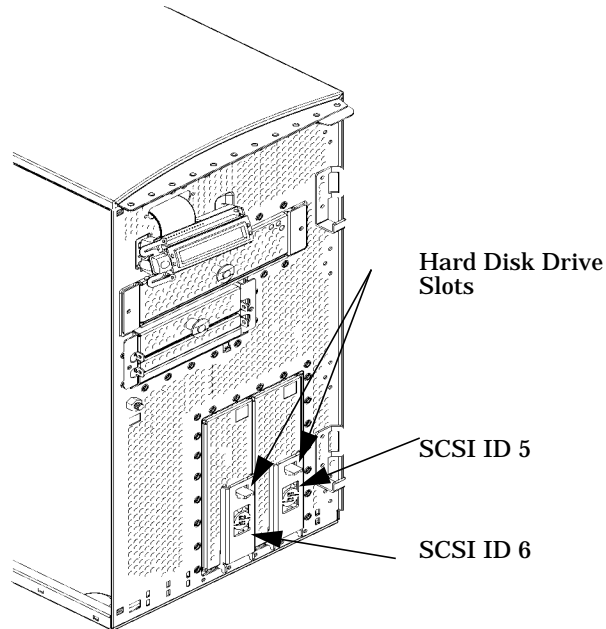


### Removing a Hard Disk Drive

This procedure explains how to remove the hard disk drive. Note that there are no cables for you to worry about when removing a hard disk drive.

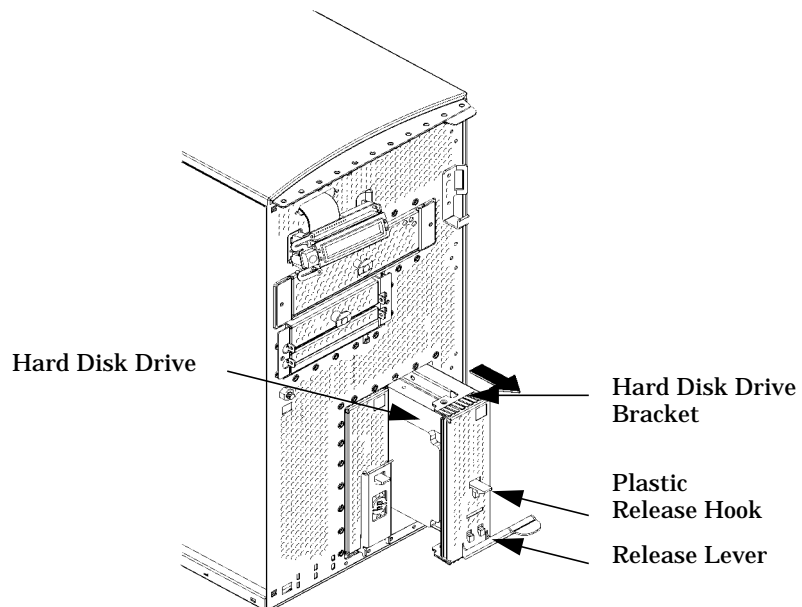
1. Open the front panel of the system using the instructions found in the section “Opening the System Front Panel.” In the lower-right corner of the system unit as you face it, there are two hard drive slots. The slot on the far right is the one discussed in this section. See Figure 4-51.

**Figure 4-51. The Hard Drive Slots**



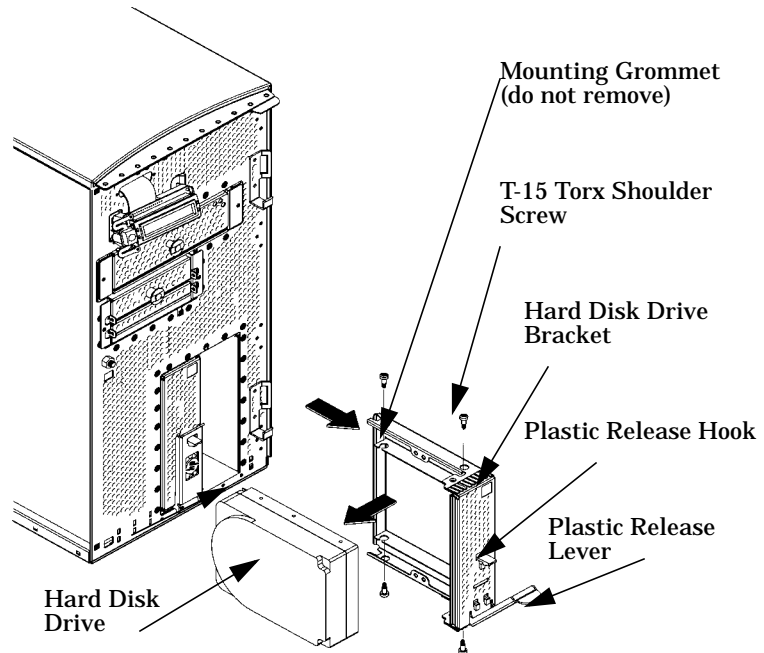
2. Open the hard drive slot by pressing the plastic release hook upward and pulling outward on the release lever as shown in Figure 4-52.. As you pull outward on the release lever, the hard drive bracket will slide out of its slot.

**Figure 4-52. Removing the Hard Disk Drive**



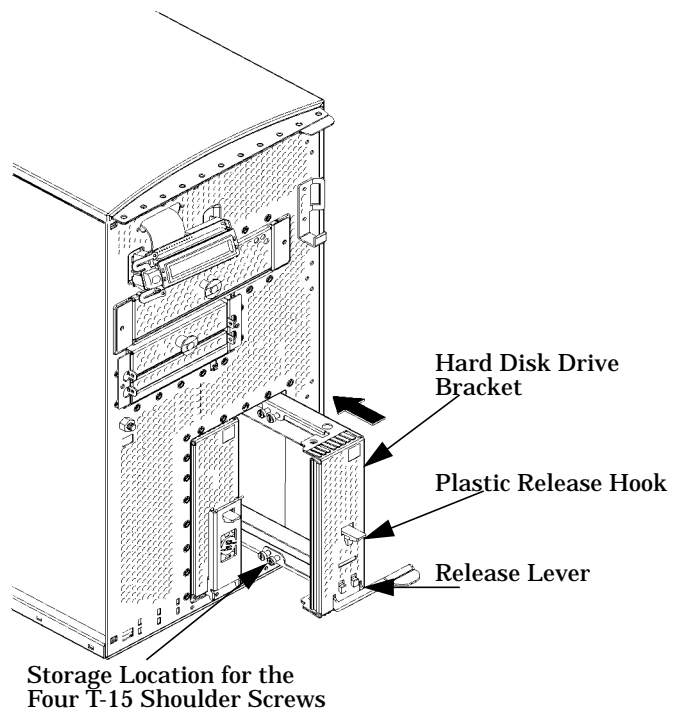
3. Remove the four T-15 Torx screws from the hard disk drive bracket. See Figure 4-53..

**Figure 4-53. Removing the Hard Disk Drive from the Bracket**



4. Slide the assembly into its hard drive slot, and push inward on the release lever until the front of the hard drive bracket is flush with the system unit. See Figure 4-54.

**Figure 4-54. Replacing the Hard Disk Drive Bracket**



## DIMM Cards

This section contains information regarding the installation and removal of memory (DIMM cards). Before continuing with this section, carefully read the following list of considerations:

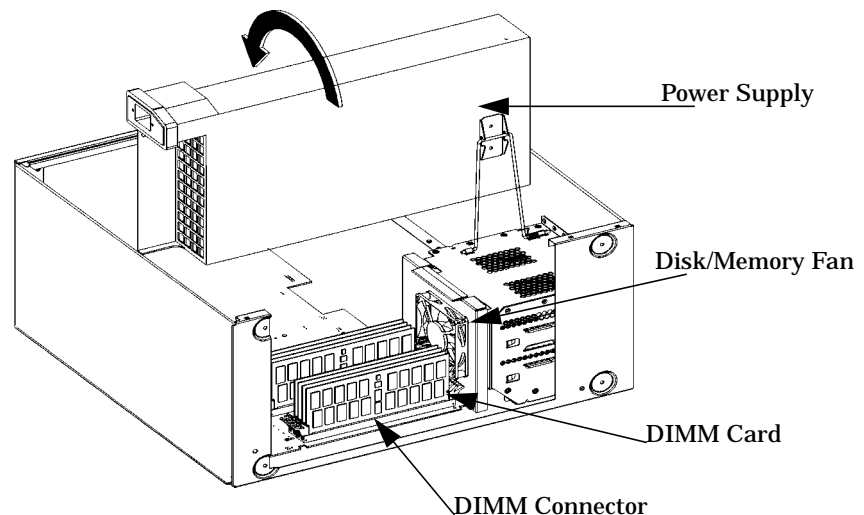
- Use the procedure described in “Displaying the Current Memory Configuration” on page 175 before attempting to install additional memory DIMMs in the workstation.
- Review the steps involved in installing memory DIMMs before you begin.
- Insert DIMMs in the order shown. Please refer to Figure 4-56.
- Note the proper orientation for DIMMs when inserting them into their connectors because the connectors are keyed to prevent backwards installation. See Figure 4-57.
- Use the “Boot Console Handler” to verify that the computer recognizes the additional DIMMs when you have finished installation.

### Installing Additional Memory

Perform the following steps to add memory (DIMM cards) to the workstation.

1. Open the side panel of the system unit as explained in the section “Opening the Left Side Panel of the System Unit” of this chapter.
2. Lay the system on its side as shown in Figure 4-55. The memory slots should be aligned as shown in Figure 4-57. Figure 4-56. provides the loading sequence for the DIMM cards. Currently the B Class and C Class workstations use 128 Mbyte and 256 Mbyte DIMM cards. Note that the DIMM cards do *not* have to be loaded in pairs.

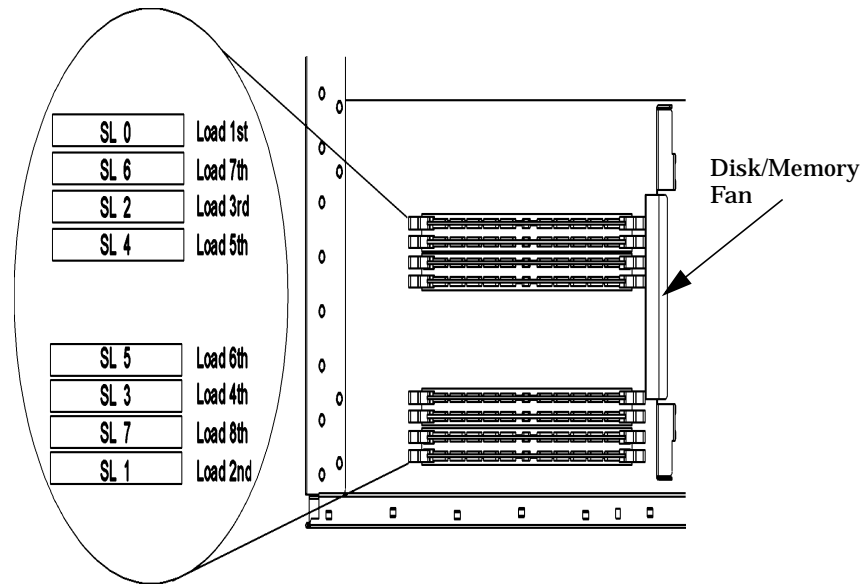
**Figure 4-55. Propping Up the Power Supply**



3. Prop up the system unit power supply as explained in the section “Propping Up the System Unit Power Supply” in this chapter.

4. For ease in installation of additional memory the hard disk drive fan may need to be removed. See the section “Removing the Fan from the Hard Disk Drive Area” on page 110 in this chapter.
5. Load the DIMM cards in the slots using the loading sequence provided in Figure 4-56.

**Figure 4-56. DIMM Card Slot Numbers and Loading Sequence**



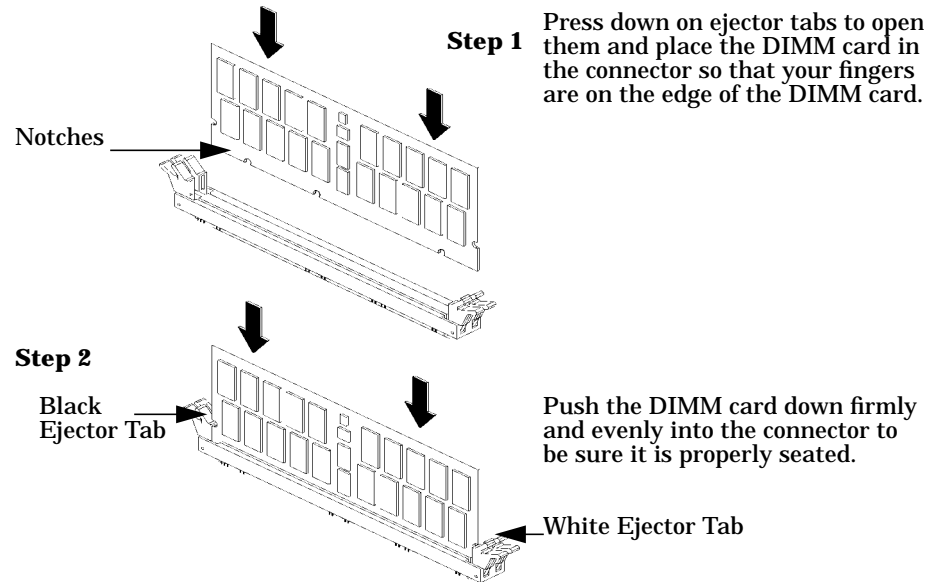
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**NOTE** When installing DIMMs, you need to orient the notches on the bottom edge of the DIMM card so that they are aligned with the keys on the DIMM connector. See Figure 4-57. The keyed DIMM connectors prevent you from installing the DIMM cards backwards.

---

6. Press downward on the ejector tabs located on both sides of the DIMM connector. See Figure 4-57. This opens the connector for DIMM card insertion.

**Figure 4-57. Installing Memory Cards**



7. Place the DIMM card in the connector, lining it up with the guides. Make sure to put the notched end toward the white ejector tab (to the left). See Figure 4-57.
8. Close the ejector tab.
9. Press firmly and evenly on the DIMM card to ensure that it seats properly. The ejector tabs engage when the DIMM is properly seated.
10. Replace the power supply and workstation left side panel. You may now plug the power cord back in to the electrical outlet.
11. Verify that this installation was successful by following the steps in Chapter 6, "The Boot Console Handler." If you have only replaced a faulty DIMM, you must execute the `pdt clear` command in the service menu of the Boot Console Handler. Answer yes (Y) to the prompt "Continue? (Y/N) >."

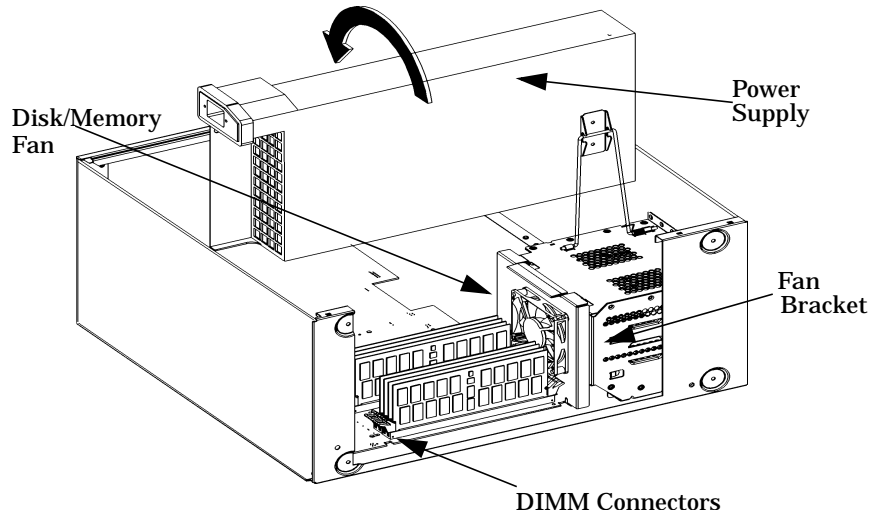
Once you have completed the steps listed above, the DIMM cards are properly loaded.

### Removing Memory

Perform the following steps to remove memory (DIMM cards) from the system unit.

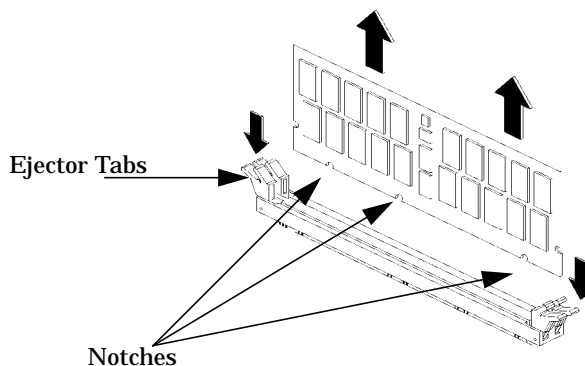
1. Open the side panel of the system unit as explained in the section "Opening the Left Side Panel of the System Unit" in this chapter.
2. Lay the system on its side as shown in Figure 4-58.

**Figure 4-58. Propping Up the Power Supply**



3. Prop up the system unit power supply as explained in the section “Propping Up the System Unit Power Supply” in this chapter.
4. For ease in removing memory cards, remove the fan from the hard disk drive chassis. See the section “Removing the Fan from the Hard Disk Drive Chassis” in this chapter.
5. Press downward on the ejector tabs located on both sides of the DIMM connector. See Figure 4-59. This raises the DIMM card for easy extraction.

**Figure 4-59. Removing Memory Cards**



6. Lift up evenly on the outside edges of the DIMM card. See Figure 4-59..
7. Replace the power supply and system unit side panel. You may now plug the power cord back into the electrical outlet.
8. Verify that the removal was successful by following the steps in Chapter 6, “Boot Console Handler.”



## System Unit LCD

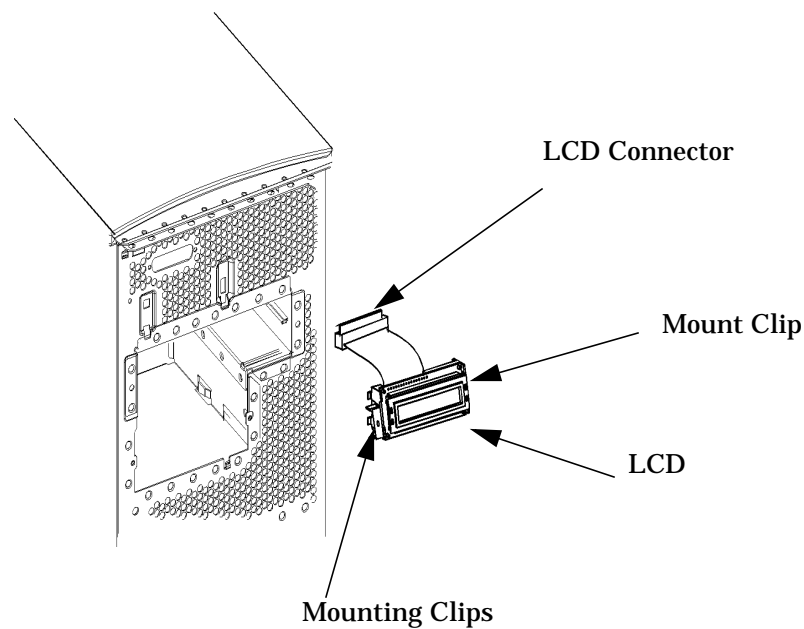
This section describes how to remove and replace the B Class and C Class workstation power switch/LCD assembly, which is located on the front panel.

### Removing the System Unit LCD

To remove the LCD assembly, perform the following steps:

1. Open the system unit's front panel as shown in the section "Opening the System Unit Front Panel."
2. Unplug the LCD's connector as shown in Figure 4-60.

**Figure 4-60. Removing the System Unit LCD**



3. Press inward on the mount clip located on the right side of the LCD mount and pull the right side of the LCD outward in a clockwise motion. See Figure 4-60.. This action releases the LCD's left side mounting clips.

### Replacing the Power Switch/LCD Assembly

To replace the power switch/LCD assembly, do the following:

1. Open the system unit's front panel as shown in the section "Opening the System Unit Front Panel."
2. Insert the LCD's left-side mounting clips into the slots shown on the system unit chassis. See Figure 4-60. Press inward on the mount clip located on the right side of the LCD mount bracket and insert this clip into the hole provided for it on the system unit chassis.
3. Plug in the LCD connector as shown in Figure 4-60.

4. Replace the system unit's front panel. This completes the installation of the system LCD assembly.

## The System Board

The system board contains the I/O section, computer main memory, CPU, and all of the circuitry and connections that control how the workstation's hardware and operating system interact with each other. If any of the components on the system board are defective, you must remove the system board from the workstation chassis.

The system board in the B Class and C Class workstation is mounted on a tray. The following procedures describe how to remove and replace the system board tray assembly as a complete unit.

### Removing the System Board

To remove the system board tray assembly, do the following:

1. Remove the left side panel as explained in the section "Opening the Left Side Panel of the System Unit" in this chapter.

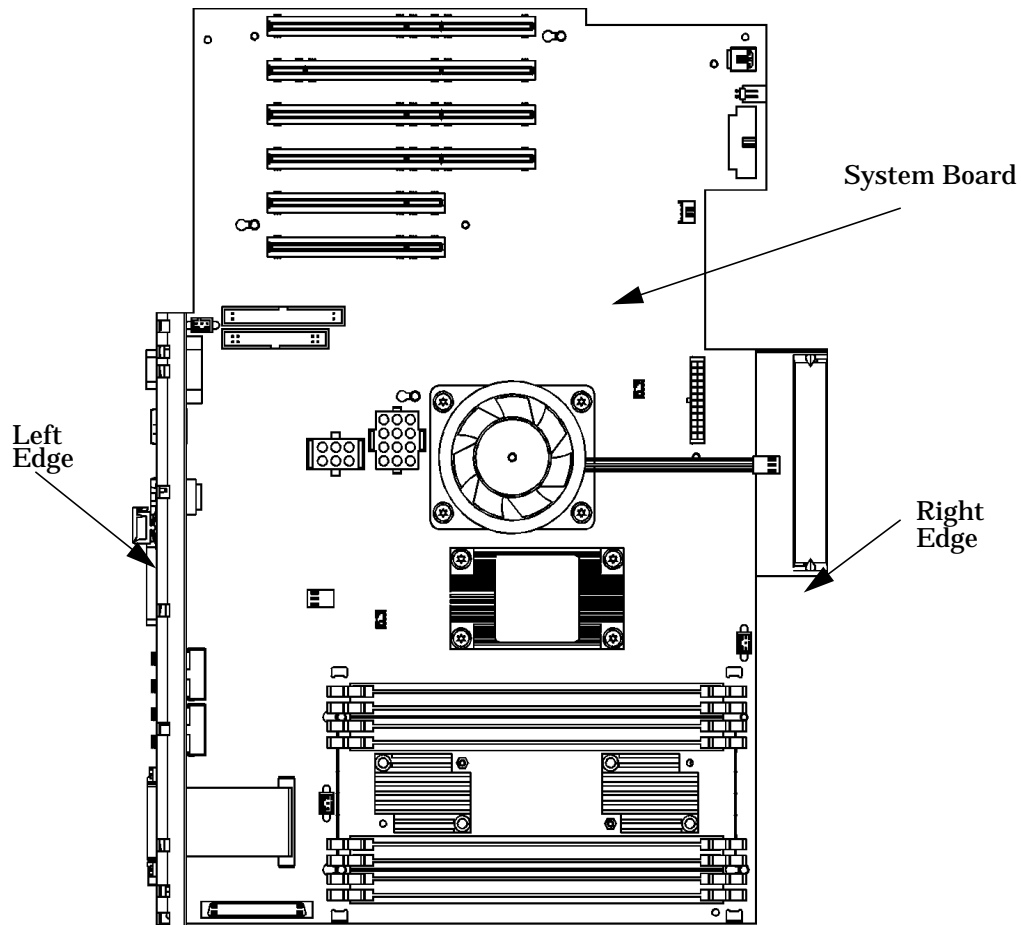
---

<b>NOTE</b>	Remove the terminators on the rear panel of the workstation.
-------------	--

---

2. Remove the two T-15 Torx screws that secure the system board tray assembly to the rear panel of the workstation.
3. Remove the system unit power supply as covered in the section "System Unit Power Supply" in this chapter.
4. Remove the hard disk drive fan as described in the section "Removing the Fan from the Hard Disk Drive Area".
5. Remove the DIMM cards as explained in the section "Removing Memory" in this chapter.
6. Remove the PCI retainer, the I/O cards from their PCI slots and the air divider as covered earlier in this chapter.
7. Unplug the following cables from the system board:
  - a. Floppy disk drive data cable
  - b. CD drive data cable
  - c. Hard disk drive fan cable
  - d. Fan/Speaker cables
  - e. LCD ribbon cable
  - f. CD drive audio cable
  - g. System board fan cables (2)
  - h. Ultra2 Wide LVD SCSI cable

**Figure 4-61. Removing the System Board**



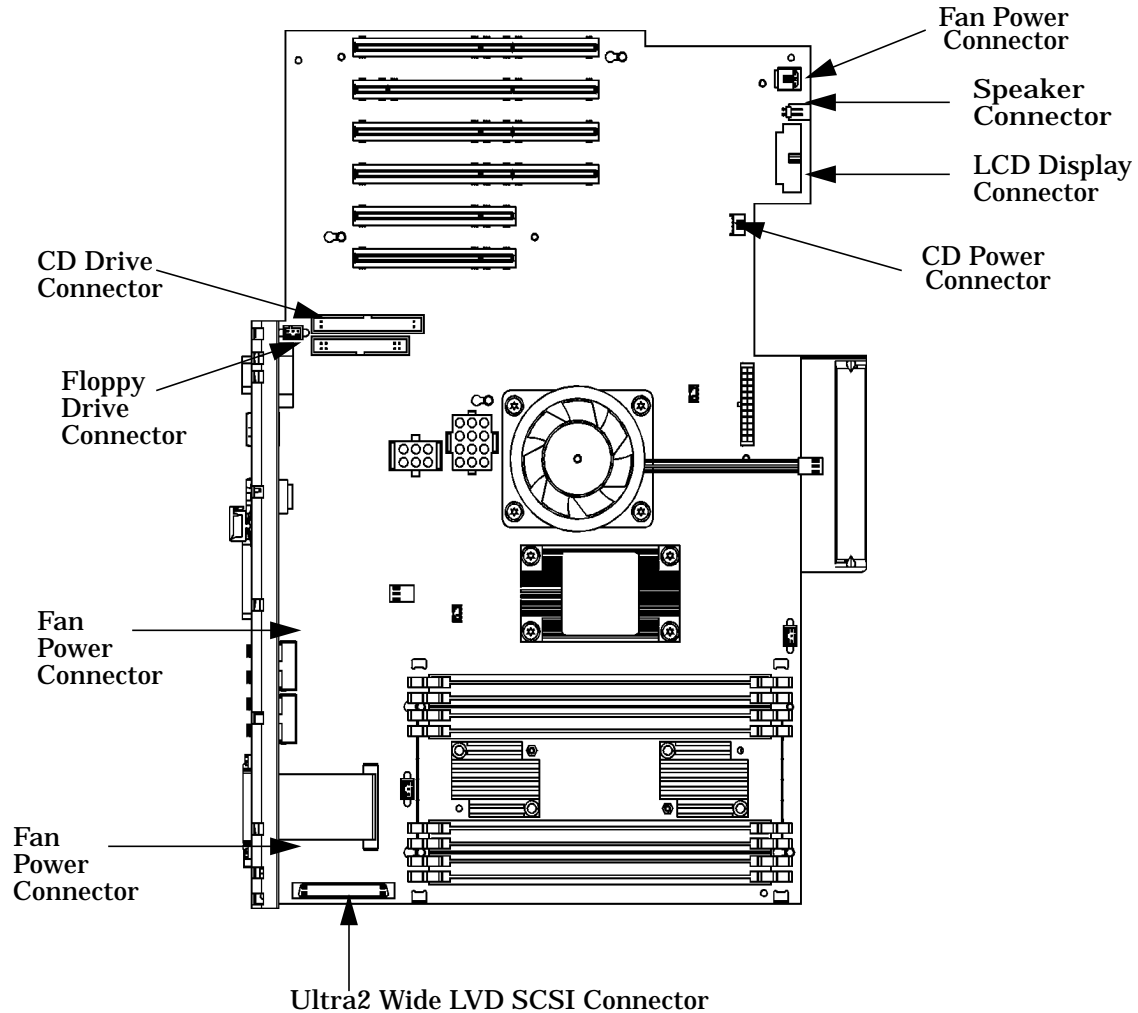
8. Fold back the workstation cables to avoid interference or damage.
9. Grasp the system board tray handle and slide the system board to the front of the workstation. The system board tray keyholes are unlatched from the chassis wall hooks. Lift the system board up then rotate to clear the top chassis hem and remove.

### **Installing the System Board Tray Assembly**

To install the system board perform the following steps:

1. Angle the system board assembly diagonally as you begin installation. Position the system board flat inside the chassis. Slide the system board tray slightly to the front and then to the rear of the workstation to engage the chassis wall hooks. See Figure 4-62.

**Figure 4-62. Installing the System Board**



2. Re-attach the cables described in step 7 of “Removing the System Board” on page 147 and replace the two T-15 Torx screws on the rear of the chassis.
3. Replace the following components:
  - a. Power supply
  - b. DIMM cards
  - c. Hard disk drive fan
  - d. PCI air divider
  - e. PCI cards
  - f. PCI retainer
4. Replace the left side panel as explained in the section “Opening the Left Side Panel of the System Unit” in this chapter.

## Replacing the Battery

The battery in the B Class and C Class workstation is contained within the real time clock module, part number 1826-4269, on the system board. The component reference designation is U33 on the system board. Follow the steps below to replace the battery:

1. Close all open applications on the workstation then use the power button on the front panel to shut down.
2. Unplug the power cord from the workstation to disconnect all AC power. Remove the workstation left side panel and place the workstation flat on a cushioned stable surface. Adhere to electrostatically safe best practices before handling any internal components.
3. Remove the two captive screws for the power supply shown in Figure 4-7. on page 102. Pull up on the power supply handle to engage the bail support for positioning the power supply at approximately 90° to the system board.

Unplug the 6-pin power supply cable from the system board and move aside for accessing the dual-in-line pin socket connector.

4. Carefully remove the defective real time clock module. Note the polarity dot which is silk-screened on the component side of the circuit board.

---

<b>CAUTION</b>	Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions
----------------	---

---

---

<b>CAUTION</b>	Il y a danger d'explosion s'il y a remplacement incorrect de la batterie. Remplacer uniquement avec une batterie du même type ou d'un type recommandé par le constructeur. Mettre au rebut les batteries usagées conformément aux instructions du fabricant.
----------------	--

---

5. Insert the replacement part for U33 with the correct polarity to ensure proper functionality. See Table 4-2. on page 95 for the correct part number.
6. Reconnect the 6-pin power supply cable to the system board. Push back slightly on the power supply to disengage the support bail from the bail lock. Lower the power supply to original operating position. See Figure 4-8. on page 103.
7. Replace the left side panel of the system unit as shown in the section "Closing the left Side Panel of the System Unit" in this chapter.

Carefully inspect the seating of the left side panel in the mainframe chassis to assure that the safety interlock switch is activated.

Apply AC power to the workstation and cycle the power button to the on position.

8. The B Class and C Class workstation is now ready to reboot with the operational battery.

---

## 5 Diagrams

This chapter provides functional information about the B Class and C Class workstations. The following block diagrams are intended as a guide to understanding the overall power distribution and the functional overview of the workstations.

## System Power

Figure 5–1 shows the system power distribution.

**Figure 5-1. Power Distribution Diagram**

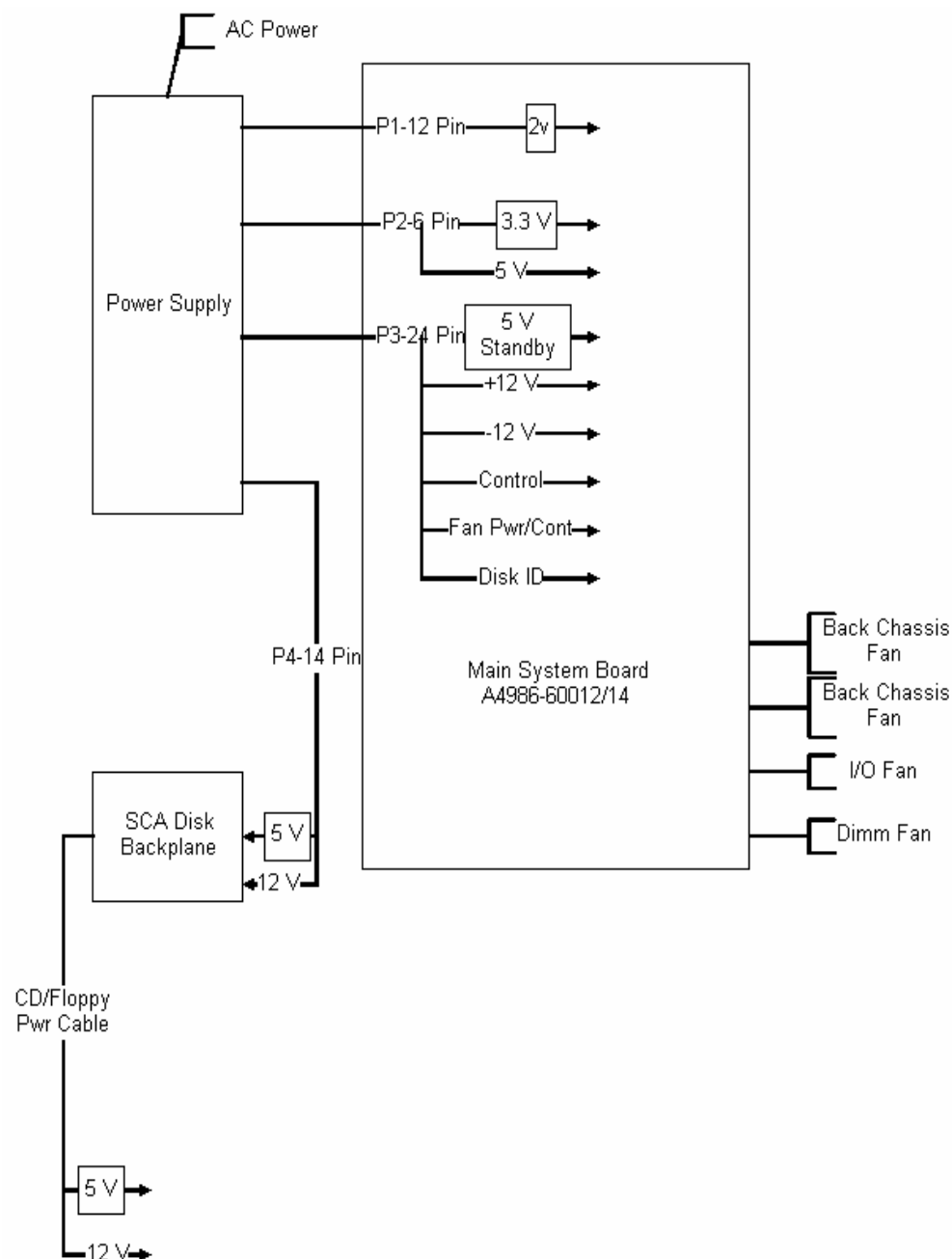
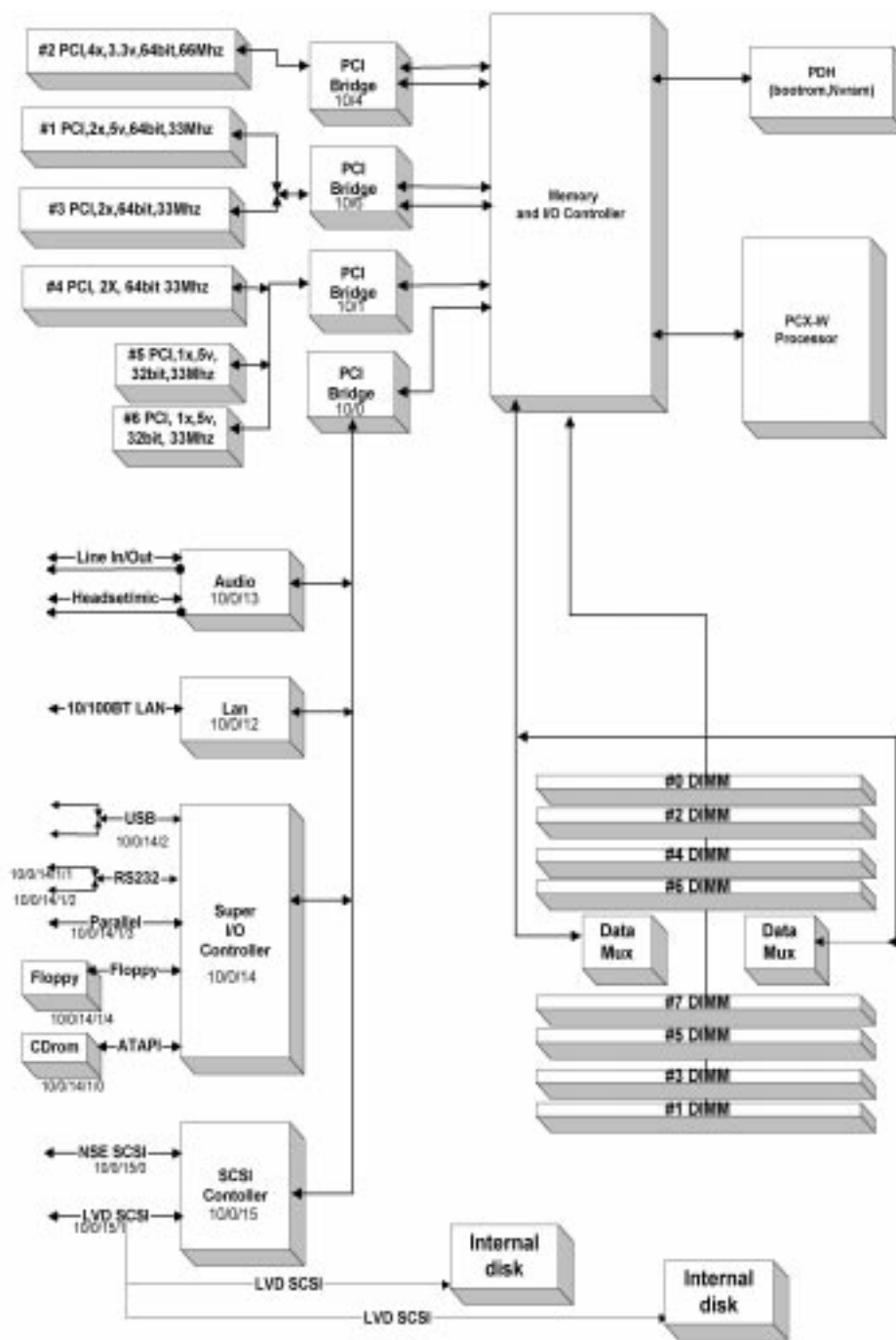




Figure 5-2 shows the system unit block diagram.

**Figure 5-2. System Unit Functional Block Diagram**





---

## **6 Boot Console Handler**

This chapter explains how to use the Boot Console Handler, which provides an interactive environment after the power-on sequence in HP Visualize B Class and C Class workstations.

Here are the topics covered in this chapter:

- Boot Console Handler Features
- Accessing the Boot Console Handler
- Booting the Workstation
- Searching for Bootable Media
- Resetting the Workstation
- Displaying and Setting Paths
- Displaying and Setting the Monitor type
- Changing the Console to an External Terminal
- Displaying the Current Memory Configuration
- Display the Status of the System I/O
- Setting the Auto Boot and Auto Search
- Displaying and Setting the Security Mode
- Displaying and setting the Fastboot
- Displaying the LAN station address
- Displaying System Information
- Displaying PIM information

---

## Boot Console Handler Features

There are times when you want to interact directly with the hardware of your computer before it boots the operating system. The workstation provides a menu-driven boot console handler that allows you to perform special tasks, display information, and set certain system parameters, even if the operating system is unavailable.

Here are some of the things you can do:

- Boot your computer
- Search for bootable media
- Reset your computer
- Display and set boot paths
- Display and set your monitor type
- Display memory configuration information
- Display the status of the PCI slots
- Set Auto Boot, Auto Search, and Auto Start
- Set Fastboot
- Display LAN information
- Display system information

The boot console menus follow, showing the various tasks you can perform and the available information.

The shortened version of all commands is indicated by the uppercase letters.

Help is available for all the menus and commands by using either **help**, **he** or **?** and the menu or command for which you want help.

## Accessing the Boot Console Handler

If the workstation has crashed or power was turned off for some reason, press the power switch and proceed to step 3. Otherwise, to access the boot console handler, follow these steps:

1. Close any files and applications on your computer.
2. Press the power switch on the front panel of the workstation.

---

<b>NOTE</b>	There is no need to manually shut down the HP-UX operating system on your computer before powering it off. When you turn off the power switch, your computer automatically shuts down the operating system before terminating the power.
-------------	--

---

Make sure you do not unplug the system's power cord or otherwise interrupt power to the system unit at this time.

3. Power on the workstation after it has completely shut down. If Autoboot is turned off, the boot sequence automatically stops at the boot console Main Menu.

If auto boot is turned on, you will see the following message:

```
Processor is starting Autoboot process. To  
discontinue, press any key within 10 seconds.
```

If auto boot and auto search are both turned on, you will see the following message:

```
Processor is booting from first available device. To discontinue,  
press any key within 10 seconds.
```

---

<b>NOTE</b>	If you are using a power-saving monitor, you will have less than 10 seconds from the time this message appears to press a key.
-------------	--

---

4. Press a key. You will then see the message:

```
Boot terminated
```

The Main Menu of the boot console appears.

---

## Boot Console Menus

The boot console menus follow, showing the various tasks you can perform and the available information.

The shortened version of all commands is indicated by the uppercase letters.

Help is available for all the menus and commands by typing either **help**, **he** or **?** and the menu or command for which you want help.

## Here are the menus:

----- Main Menu -----	
Command	Description
-----	
BOot [PRI ALT <path>]	Boot from specified path
PAth [PRI ALT CON KEY  [<path>]	Display or modify a path
SEArch [DIsplay IPL] [<path>]	Search for boot devices
COntfiguration [ <command>]	Access Configuration menu/commands
INformation [ <command>]	Access Information menu/commands
Service [ <command>]	Access Service menu/commands
DIsplay	Redisplay the current menu
HElp [ <menu>   <commands>]	Display help for menu or command
RESET	Restart the system
-----	
Main Menu: Enter command >	



----- Configuration Menu -----

Command	Description
-----	-----
AUto [BOot SEArch][ON OFF]	Display or set specified auto flag
BootID [<proc>] [<boot ID>]	Display or modify processor boot ID
BootINfo	Display boot-related information
BootTimer [0 - 200]	Seconds allowed for boot attempt
CPUConfig [<proc>] [ON OFF]	Config/deconfig processor
DEfault	Set the system to predefined values
FastBoot [ON OFF]	Display or set boot tests execution
LanConfig [<params>]	Display or set LAN Configuration
MONitor [LIST <path> <type>]	Change the current monitor type
PAth [PRI ALT CON KEY] [<path>]	Display or modify a path
SEArch [DISplay IPL] [<path>]	Search for boot devices
SECure [ON OFF]	Set/show security mode
Time [c:y:m:d:h:m:[s]]	Read or set real time clock in GMT
PreviousPower PreviousPower [ON OFF]	Set previous power state
BOot [<menu> <command>]	Display help for menu or command
Display	Redisplay the current menu
HElp [<menu> <command>]	Display help for menu or command
RESET	Restart the system
MAin	Return to Main Menu

-----

Configuration Menu: Enter command >

```
----- Information Menu -----  
  
Command          Description  
-----  
ALL              Display all system information  
BootINfo        Display boot-related information  
CAche           Display cache information  
ChipRevisions   Display revisions of VLSI and firmware  
COpcessor       Display coprocessor information  
FwrVersion      Display firmware version  
IO              Display I/O interface information  
LanAddress      Display built-in system LAN address  
MEemory         Display memory information  
PRocessor       Display processor information  
WArnings        Display selftest warning messages  
  
B0ot [PRI|ALT|<path>]  Boot from specified path  
DIsplay         Redisplay the current menu  
HElp [<menu>|<command>] Display help for menu or command  
RESET          Restart the system  
MAin           Return to Main Menu  
  
-----  
Information Menu: Enter command >
```

----- Service Menu -----

Command	Description
ChassisCodes [<proc>]	Display/enable/disable chassis codes
CLEARPIM	Clear (zero) the contents of PIM
EepromRead [<addr>] {<len>}	Read EEPROM locations
MemRead <addr> [<len>] [a]	Read memory locations
PCIDelay [<value>]	Display or set PCI delay value
PDT [CLEAR]	Display or clear the Page Deallocation Table
PIM [<proc> [HPMC LPMC TOC]]	Display PIM information
ScRoll [ON OFF]	Display or change scrolling ability
BOot [PRI ALT <path>]	Boot from specified path
Display	Redisplay the current menu
HElp	Display help for menu or command
RESET	Restart the system
MAin	Return to Main Menu

-----

Service Menu: Enter command >

## Booting The Workstation

In general the B Class and C Class workstation is started by the power switch and HP-UX boots automatically. However, you may not always want the usual sequence to occur.

For example, you may want to start the workstation from an operating system that is stored on a device that is different from the usual boot device. If the normal operating system kernel or the disk on which it resides becomes damaged or unusable, you may wish to boot from a different disk or perhaps another type of device, such as a CD drive.

Here are some possible booting scenarios you may encounter:

- If you know which device you want to boot from, and you know that it contains a bootable operating system, follow the directions in “Accessing the Boot Console Handler” earlier in this chapter, and then type the following at the prompt and press **Enter**:

```
Main Menu:      Enter command > boot device
```

where *device* is the hardware path to the device, specified in Mnemonic Style Notation. For example, if you wish to boot an operating system that is stored on a DDS-format tape drive that is located at the hardware path `scsi.1.0`, you would type the following command at the prompt and press **Enter**:

```
Main Menu:      Enter command > boot scsi.1.0
```

- If you do not know which device you want to boot from, then type the following at the prompt and press **Enter**:

```
Main Menu:      Enter command > search
```

A message similar to the following will be displayed:

Path Number	Device Path	Device Type
-----	-----	-----
P0	IDE	TEAC CD-532E-B
P1	FWSCSI.6.0	SEAGATE ST39102LC

At the prompt, you might type the following and press **Enter**:

```
Main Menu:      Enter command > boot P1
```

Note that the operating system on the specified device (P1) is used to boot the workstation (also, see the section “Searching for Bootable Media”).

- If you wish to interact with the Initial System Loader (ISL) before booting the workstation, follow the directions in “Accessing the Boot Console Handler” earlier in this chapter, and then type the following at the prompt and press **Enter**:

```
Main Menu:      Enter command > boot device
```

The following prompt will appear:

```
Interact with ISL (Y, N, Q) >
```

Answering yes (Y) causes the ISL to be loaded from the specified device. After a short time, the following prompt appears on your screen:

```
ISL>
```

ISL is the program that actually controls the loading of the operating system. By interacting with ISL, you can choose to load an alternate version of the HP-UX operating system. If you do not want to interact with ISL, you must enter no (N).

For example, if the usual kernel (/stand/vmunix) on your root disk (fwscsi.6.0) has become corrupted, and you wish to boot your computer from the backup kernel (/stand/vmunix.prev), type the following at the ISL> prompt and press **Enter**:

```
ISL> hpux /stand/vmunix.prev
```

- If you do not know which media in your file systems have bootable operating systems, you can find them with the `search ipl` command.

## Searching for Bootable Media

To list devices that contain bootable media, follow the directions in “Accessing the Boot Console Handler” earlier in this chapter, and then type the following at the prompt and press **Enter**:

```
Main Menu: Enter command > search ipl
```

The search command searches all buses. The search may turn up more devices than there are lines on your display. If you are using a text terminal, you may control the progress of the search from your terminal’s keyboard by performing the following steps:

- To hold the display temporarily, press **Ctrl S**
- To continue the display, press **Ctrl Q**
- To halt the search, press any other key

These flow-control commands do not work with a bit-mapped display, but such a display can show more than forty lines of text, so you are unlikely to need them.

To search for devices of just one type that actually contain bootable media, follow the directions in “Accessing the Boot Console Handler” earlier in this chapter, and then type the following at the prompt and press **Enter**:

```
Main Menu: Enter command> search ipl device_type
```

Where *device\_type* is one of the following:

- *fwscsi* is the built-in Ultra2 Wide LVD SCSI bus.
- *scsi* is the built-in Fast Narrow Single-Ended SCSI bus.
- *lan* is all connections to the built-in LAN.
- *ide* is the built-in CD-ROM.
- *pcin* is an optional SCSI interface in slot number *n*.

For more information about the `SEARCH` command, type the following at the prompt and press **Enter**:

```
Main Menu: Enter command> help search
```

## Resetting the Workstation

To reset your workstation to its predefined values, follow the directions in “Accessing the Boot Console Handler” earlier in this chapter, and then type the following at the prompt and press **Enter**:

```
Main Menu: Enter command > co
```

When the Configuration Menu appears, type the following at the prompt and press **Enter**:

```
Configuration Menu: Enter command > default
```

When the Configuration Menu appears, type the following at the prompt and press **Enter**:

```
Config Menu: Enter command > reset
```

---

## Displaying and Setting Paths

A path is the hardware address of a device that is attached to the I/O system of your workstation. The path command sets the system paths shown in Table 6-1.

The path command sets and displays the hardware address of a specified device attached to the I/O bus of your workstation.

**Table 6-1. System Paths**

Path Type	Device
primary or pri	Your workstation's default boot device (usually the root disk)
alternate or alt	Your workstation's alternate boot device (usually a DDS-format tape device)
console or con	Your workstation's primary display device
keyboard or key	Your workstation's primary ASCII input device

To display the current settings for the system paths, type the following at the prompt and press **Enter**:

```
Main Menu: Enter command > path
```

The paths are displayed in Mnemonic Style Notation, as shown in Table 6-2.

**Table 6-2. Mnemonic Style Notation**

I/O	Specification Format
Built-in LVD SCSI	<i>fwscsi.scsi_address.logical_unit_number</i>
Built-in NSE SCSI	<i>scsi.scsi_address.logical_unit_number</i>
Optional SCSI	<i>pcin.scsi_address.logical_unit_number</i>
Built-in LAN	<i>lan.server_address.init_timeout.io_timeout</i>
Built-in IDE	IDE

To display the current setting for a particular system path, follow the directions in “Accessing the Boot Console Handler” earlier in this chapter, and then type the following at the prompt and press **Enter**:

```
Main Menu: enter command > path path_type
```

where *path\_type* is one of the path types listed in Table 6-1.

For example, to get the path to the primary boot device, follow the directions in “Accessing Boot Console Handler” earlier in this chapter, and then type the following at the prompt and press **Enter**:

```
Main Menu: Enter command > path primary
```

To set a system path to a new value, follow the directions in “Accessing the Boot Console



Handler” earlier in this chapter, and then type the following at the prompt and press **Enter**:

```
Main Menu: Enter command > path path_type path
```

where *path\_type* is one of the path types listed in Table 6-1 and *path* is the specification of the path in Mnemonic Style Notation (as described in Table 6-2). For example, to set the primary boot path to a SCSI disk with an ID of 6.0, follow the directions in “Accessing the Boot Console Handler” earlier in this chapter, and then type the following at the prompt:

```
Main Menu: Enter command > path pri fwscsi.6.0
```

## Displaying and Setting the Monitor Type

The workstation ships from the factory preset to use a monitor with a specific resolution and frequency. If you replace your workstation's monitor with a different type of monitor, you must reconfigure your workstation to support the new monitor.

### The Monitor Command

The `monitor` command lets you change your workstation's graphics configuration. This command is available in the Configuration Menu of the Boot Console Handler.

---

**NOTE** The `monitor` command lets you change your workstation's graphics configuration before you replace your monitor.

---

To display the current graphics and console information, enter the following command:

```
Main Menu: Enter command> configuration
Configuration Menu: Enter command> monitor
```

The correct usage for setting the graphics configurations is:

```
monitor graphics_path type
```

where valid *graphics\_path* parameters are:

- `graphics(1)` - Graphics adapter installed in option slot 1.
- `graphics(2)` - Graphics adapter installed in option slot 2 (primary slot).
- `graphics(3)` - Graphics adapter installed in option slot 3.
- `graphics(4)` - Graphics adapter installed in option slot 4 (secondary slot).
- `graphics(5)` - Graphics adapter installed in option slot 5.
- `graphics(6)` - Graphics adapter installed in option slot 6.

and *type* is the numerical monitor type as shown with the `monitor list` command. For example, an HP VISUALIZE-EG graphics card (A4977A) installed in option slot 2 would be `graphics(2)`. Note that you can have `graphics(1)` through `graphics(6)` for your *graphics\_path*; however, there are two preferred I/O slots available for graphics cards in the workstation. Those slots are slots 2 and 4. Slot 2 is the primary graphics card slot, and slot 4 is the secondary graphics card slot.

---

**NOTE** No space/blank characters may be used in the *graphics\_path* names.

---

## Displaying the Current Monitor Configuration

To display the current monitor configuration for your system from the Configuration Menu of the Boot Console Handler, follow the directions in “Accessing the Boot Console Handler” in this chapter. Once you are in the Boot Console Handler Main Menu, type the following command and press **Enter**:

```
Main Menu: Enter command> configuration
```

This places you in the Configuration Menu. From here, type the following command at the prompt and press **Enter**:

```
Config Menu: Enter command> monitor
```

The screen displays a list of the current graphics adapters and their monitor types configured for the workstation.

### MONITOR INFORMATION

Path	Slot	Head	HPA	Resolution	Freq	Type	Class
GRAPHICS(2)	2	1	ffffa000000	1280x1024	75Hz	1	PCI

```
Configuration Menu: Enter command>
```

In this example, only the graphics adapter, GRAPHICS(2), is configured. The monitor type for GRAPHICS(2) is set to type 1, which for this card is a 1280x1024 monitor that uses a frequency of 75 Hz.

## Setting the Monitor Type

You can set the monitor type for a graphics adapter by typing the following at the prompt and pressing **Enter**:

```
Configuration Menu: Enter command>monitor graphics(n) tt
```

Where *n* is the number of the graphics adapter and *tt* is the monitor type. To display a list of supported monitors that are used by the graphics card, type the following command at the prompt and press **Enter**:

```
Configuration Menu: Enter command>monitor list
```

A list of valid monitor types similar to the following is displayed:

### MONITOR INFORMATION

Path	Slot	Head	Type	Size	Freq	Class
GRAPHICS(2)	2	1	1	1280x1024	75Hz	PCI
GRAPHICS(2)	2	1	2	1280x1024	75Hz	PCI, Double buffered
GRAPHICS(2)	2	1	3	1280x1024	75Hz	PCI, Greyscale
GRAPHICS(2)	2	1	4	1280x1024	75Hz	PCI, Double buffered, Greyscale
GRAPHICS(2)	2	1	5	1280x768	75Hz	PCI
GRAPHICS(2)	2	1	6	800x600	75Hz	PCI
GRAPHICS(2)	2	1	7	640x480	75Hz	PCI
GRAPHICS(2)	2	1	8	1600x1200	75Hz	PCI
GRAPHICS(2)	2	1	9	1600x1200	75Hz	PCI, Greyscale
GRAPHICS(2)	2	1	10	1200x1600	75Hz	PCI
GRAPHICS(2)	2	1	11	1200x1600	75Hz	PCI, Greyscale
GRAPHICS(2)	2	1	12	1280x1024	72Hz	
GRAPHICS(2)	2	1	13	1280x1024	72Hz	Double buffered
GRAPHICS(2)	2	1	14	640x480	60Hz	
GRAPHICS(2)	2	1	15	-----	user defined	-----

```
Configuration Menu: Enter command>
```

To set the monitor type for GRAPHICS(2) to monitor type 1 type the following at the command prompt and press **Enter**:

```
Config Menu: Enter command>monitor graphics(2) 1
```

This will take effect on the next reboot.

### MONITOR INFORMATION

Path	Slot	Head	HPA	Resolution	Freq	Type	Class
GRAPHICS(2)	2	1	fffa000000	1280x1024	75Hz	1	PCI

```
Configuration Menu: Enter command>
```

The boot console may display a message that tells you that your new monitor selection will take effect the next time you reboot your workstation. The boot console also displays the new monitor information.

Trying to change the monitor type to a number not listed for that graphics device fails and gives you the following warning message:

```
Value of monitor type n out of range (n - nn)
```

Trying to change the monitor type on an empty slot fails and gives you the following warning message:

```
No such graphics card.
```

## Setting the Monitor Type at Power On

If you replace your workstation's monitor with a different monitor type, you need to let the computer's firmware know you made this change. To do this, reboot the workstation and use either the automatic monitor selection process or the boot console handler's `monitor` command.

Once you have rebooted the system by turning it off, wait for a short time for the hard disk drive's disk to stop spinning. Next, turn the workstation on and watch for the **Num Lock** light to flash.

---

**NOTE** It takes approximately one to two minutes after powering on the workstation before the **Num Lock** light flashes.

---

Wait two seconds after the **Num Lock** light comes on, which is near the end of the boot sequence, then press **Tab** to initiate the automatic monitor selection process. If your screen remains blank after two minutes of waiting for something to be displayed, see the section "Troubleshooting Monitor Problems" in this chapter. Otherwise, if you see information similar to the following displayed on your screen and it is the correct monitor type, press the **Enter** key to select it.

```
MONITOR INFORMATION
```

Path	Slot	Head	Type	Size	Freq	Class
-----	-----	----	-----	-----	-----	-----
GRAPHICS(2)	2	1	<i>n</i>	<i>nnnnxnnnn</i>	<i>nnHz</i>	PCI

```
Press[RETURN]to select this monitor type(type n of n types)
```

Note that if you do not select this monitor type, the system cycles through all of the available monitor types one at a time until you find one that meets your needs.

Once you have made your monitor type selection, the system queries you to confirm your selection. Press **Y** to save this monitor type.

If you press any key other than **Y**, the following message is displayed:

```
Monitor type not saved.
```

At this point, the new monitor type is active, but not saved. Because you didn't save the

monitor type, the next time you reboot the system the original monitor type will be used.

Next, the following message is displayed:

```
To select a new Graphics Monitor Type press the <TAB> key now,  
otherwise EXIT by entering any other key (or will time out in 15  
seconds)...
```

To restart the monitor selection process, press **Tab**.

## Troubleshooting Monitor Problems

In the event that your console stops displaying to your graphics device, use the following procedure to set the console for displaying to an external terminal.

1. Turn the workstation power off.
2. Disconnect the USB keyboard connector from the rear panel.
3. Connect a serial terminal emulator to the Serial 1 connector (the left serial connector) on the system rear panel. Configure the terminal for: 9600 baud, No Stop Bits, No Parity, and 8 Bits.
4. Power on the system. The system will now display the console to the terminal connected to Serial 1 port. Note that you can use a 9-pin to 9-pin serial cable (HP Part Number F1044-80002) to connect an HP Omnibook serial port to the workstation.
5. Set the monitor type and path using the Boot Console Handler.

## Displaying the Current Memory Configuration

The following sample screen output uses the memory command to show a memory configuration table with properly-installed and configured memory.

To display the current memory configuration for your system, from the Information Menu of the boot console handler, follow the directions in “Accessing the Boot Console Handler”. Once you are in the Boot Console Handler Main Menu, type the following at the prompt and press **Enter**:

```
Main Menu: Enter command> information
```

This places you in the Information Menu. From here, type the following at the prompt and press **Enter**:

```
Information Menu: Enter command> memory
```

The screen displays status and configuration information for the memory DIMMs installed in the workstation.

## Memory Information Sample

The following sample shows the memory information when memory modules are properly installed and configured:

MEMORY INFORMATION

MEMORY STATUS TABLE

Slot	Size	Status
0	256MB	Active
1	256MB	Active
2	128MB	Active

TOTAL MEMORY = 640MB

MEMORY FAULT TABLE

Slot	Size	Status
------	------	--------

Active, Installed Memory : 640MB of SDRAM  
Deallocated Pages : 0 Pages

Available Memory : 640 MB  
Good Memory Required by OS : 0 (not initialized)

Memory	
HVERSION	SVERSION
0x0860	0x0900



---

## Displaying the Status of the I/O slots

The I/O command lets you identify all built-in I/O devices and optional I/O devices installed in the option slots. It is available in the Information Menu.

To use the IO command from the Information Menu of the boot console, type the following command at the prompt and press **Enter**:

```
Information Menu: Enter command> IO
```

Information about the built-in and optional I/O devices is displayed.

### I/O MODULE INFORMATION

Path	Decimal	Type	Location	HVER	SVER	Vers	Dep
----	-----	----	-----	----	----	----	---
LAN	10/0/12/0	Ethernet	built-in	0060	a200	0x02	0x00
AUDIO	10/0/13/0	Audio	built-in				
IDE	10/0/14/0	IDE	built-in	0060	a300	0x00	0x00
SUPERIO MISC	10/0/14/0	Bridge Device	built-in				
FLOPPY	10/0/14/1/0	Floppy Disk	built-in				
SERIAL_1	10/0/14/1/1	RS232 port	built-in	0060	8c00	0x01	0x00
SERIAL_2	10/0/14/1/2	RS232 port	built-in	0060	8c00	0x01	0x00
PARALLEL	10/0/14/1/3	Parallel port	built-in				
USB	10/0/14/2	USB	built-in	0060	a900	0x95	0x00
SCSI	10/0/15/0	SCSI	built-in	0060	a300	0x00	0x00
FWSCSI	10/0/15/1	SCSI	built-in	0060	a300	0x00	0x00
GRAPHICS(2)	10/6/2/0	Display	slot2	0070	8500	0x01	0x00

```
Main Menu: Enter command>
```

## Setting the Auto Boot and Auto Search Flags

The `auto boot` and `auto search` flags are variables stored in your workstation's nonvolatile memory. (Nonvolatile memory retains its contents even after power is turned off.) If you reset these flags to a new value, the change takes effect the next time you reboot the workstation.

The `auto boot` flag boots the operating system whenever the workstation is turned on.

To examine the state of the `auto boot` and `auto search` flags, type the following at the prompt and press **Enter**:

```
Configuration Menu: Enter command> auto
```

If `auto boot` is set to on, your workstation automatically attempts to boot the operating system when turned on. If `auto boot` is set to off, your workstation enters the boot administration mode of the Boot Console Handler.

The state of the `auto search` flag determines how your workstation seeks a boot device during autoboot. If `auto search` is set to on, your workstation will search for other boot devices if the primary boot device is not available. If `auto search` is off, your workstation will default to the boot administration mode if it can't see the primary boot device.

To change the state of the `auto boot` or `auto search` flags, type the following at the prompt and press **Enter**:

```
Config Menu: Enter command> auto boot state
```

or

```
Config Menu: Enter command> auto search state
```

where *state* is on or off.

`Auto search` searches for devices in the following order:

- Primary Boot Path (can be set by the user)
- Alternate Boot Path (can be set by the user)
- Ultra2 Wide Low-Voltage Differential SCSI (built-in)
- PCI 1 through PCI 6 (plug-in interface cards)
- Ultra Narrow Single-Ended SCSI (built-in)
- LAN (built-in)

## Displaying and Setting the Security Mode

The `secure` flag is a variable stored in non-volatile memory. (Non-volatile memory retains its contents even after power is turned off.) If you reset this flag to a new value, the change takes effect the next time you reboot the computer.

When the `secure` flag is set to on, `auto boot` and `auto search` are enabled and cannot be stopped. The system boots from the default boot paths regardless of user intervention.

Note that the `secure` command must be executed from within the Boot Console Handler. For information, reference the section “Accessing the Boot Console Handler”. Once the Main Menu is present, type the following command at the prompt and press **Enter**:

```
Main Menu: Enter command> configuration
```

To display the current setting for the `secure` flag, type the following command at the prompt and press **Enter**:

```
Configuration Menu: Enter command> secure
```

To set the `secure` flag on, type the following command at the prompt and press **Enter**:

```
Configuration Menu: Enter command> secure on
```

To set the `secure` flag off, you need to disconnect all possible boot devices to interrupt the boot-up sequence and force the prompt to the Boot Console Handler. Next, type the following command at the prompt and press **Enter**:

```
Configuration Menu: Enter command> secure off
```

## Displaying and Setting Fastboot Mode

When `fastboot` is enabled (set to on), the workstation does a quick check of the memory and skips some processor self tests during the power-on self tests. This enables the workstation to complete its boot process quicker. The default factory setting is for `fastboot` to be enabled (set to on).

When `fastboot` is disabled (set to off), more extensive memory and processor testing is performed during the self tests, causing the boot process to take longer.

If you are experiencing difficulty in booting the workstation, set `fastboot` to off and reboot the system. The more extensive testing may reveal the error condition.

To display the status of `fastboot`, type the following at the prompt and press **Enter**:

```
Configuration Menu: Enter command> fastboot
```

To disable `fastboot`, type the following and press **Enter**:

```
Configuration Menu: Enter command> fastboot off
```

To enable `fastboot`, type the following and press **Enter**:

```
Configuration Menu: Enter command> fastboot on
```

## Displaying and Setting the LAN Station Address

It is sometimes necessary to supply the LAN station address of the workstation to other users. For example, if the workstation is to become a member of a cluster, the cluster administrator needs to know your LAN station address in order to add your workstation to the cluster. Note that the LAN station address can be determined using the Boot Console Handler Information Menu.

A LAN station address for the workstation is the label that uniquely identifies the LAN connection for the workstation at the link level (the hardware level).

To display the workstation's LAN station address, type the following at the prompt and press **Enter**:

```
Information Menu: Enter command> lanaddress
```

The LAN station address is displayed as a twelve-digit number in hexadecimal notation, similar to the following:

```
LAN Station Address:          001083-000429
```

The address is for the workstation's built-in LAN interface.

## Displaying System Information

The `all` command allows you to display the system's processor revision and speed, cache size, memory size, flag settings, and the boot and console paths. To display system information from the Information Menu, type the following at the prompt and press **Enter**:

```
Information Menu: Enter command> all
```

This information is paged to allow you to view it as necessary, unless the `ScRoll` command has been used to disable scrolling.

---

## Displaying PIM Information

The `pim` command allows you to display the most recent PIM information for the specified fault type. To display PIM information for a specific fault, from the Service Menu, type the following at the prompt and press **Enter**:

Service Menu: Enter command `> pim processor_number fault_type`

You can use `pim` in the following ways:

`pim` - No arguments for the `pim` command returns the HPMC information for processor 0

`pim 0` - HPMC information on processor 0

`pim 0 fault_type` - fault type information on processor 0

where *fault\_type* is HPMC (high priority machine check), LPMC (low priority machine check), or TOC (transfer of control).

## Stable Storage

Stable storage is non-volatile memory associated with the PA-RISC processor module. Stable storage is used by the processor (CPU) to store:

- Device path information
- The state of the boot flags
- HPMC error information
- Operating system initialization data



---

## ISL Environment

The ISL environment provides the means to load the operating system (HP-UX) environment. The ISL environment also provides an offline platform to execute optional diagnostic and utility programs from a boot device when HP-UX does not load.

The ISL program is the first program loaded into main memory from an external medium (LAN, disk, or tape) and launched by the initial program loader (IPL) routine from the Boot Administration environment.

The ISL environment provides the following capabilities:

- Execute user-entered commands to modify boot device paths and boot options in stable storage.
- Run offline diagnostic programs and utilities
- Provide automatic booting of the HP-UX operating system after power-on or reset

## Invoking ISL from the Boot Console Handler

Perform the following steps to invoke ISL from the boot console handler:

**Step 1.** Follow the directions in “Accessing the Boot Console Handler”, and then type the following at the prompt and press **Enter**:

```
Main Menu: Enter command > boot device
```

You are prompted:

```
Interact with ISL (Y, N, or Q) > y
```

**Step 2.** Answering yes (y) causes the ISL to be loaded from the specified device. After a short time, the following prompt appears on your screen:

```
ISL>
```

ISL is the program that actually controls the loading of the operating system. By interacting with ISL, you can choose to load an alternate version of the HP-UX operating system.

For example, if the usual kernel (/stand/vmunix) on your root disk (fwscsi.6.0) has become corrupted, and you wish to boot the workstation from the backup kernel (/stand/vmunix.prev), type the following at the ISL> prompt and press **Enter**:

```
ISL> hpux /stand/vmunix.prev
```

## ISL User Commands

The following commands available in the ISL environment allow you to display and modify the boot characteristics of the system.

- `help` - lists ISL command menu and available utilities.

- `display` - displays the boot and console paths in Stable Storage and the current setting of the ISL Boot Flags.
- `primpath` - modifies the primary boot path entry in Stable Storage. The entry in Stable Storage for the primary boot device begins at byte address 0 and ends at byte address 31.
- `altpath` - modifies the alternate boot path entry in Stable Storage. The entry for the alternate boot device begins at byte address 128 and ends at 159.
- `conspath` - modifies the console path entry in Stable Storage. The console device begins at byte address 96 and ends at byte address 127. The entry for the keyboard and mouse devices begins at byte address 160 and ends at 191.
- `listautofl` or `lsautofl` - lists the contents of the (HP-UX) autoboot file.
- `support` - boots the Support Tape from the boot device.
- `readss` - displays 4 bytes (one word) from Stable Storage. The `readss` command requires a decimal number between 0 and 255 to address four bytes in Stable Storage.

---

## Obtaining and Updating System Firmware

To update a system's firmware, the firmware patch must be obtained from the patch server website at [http://us-external\\_support.hp.com](http://us-external_support.hp.com) or [http://europe-external\\_support.hp.com](http://europe-external_support.hp.com).

The patch file is a combined shar'ed file that contains an ASCII cataloging file, a readme type ASCII file, and the firmware LIF binary file. The LIF volume is bootable to ODE which in turns runs the UPDATER utility to download the firmware image files.

Creating the Firmware Update Tape (on any HP-UX system)

**Step 1.** Verify the checksum of the file ".FRM" using the "sum" command. Results of the command should be equal to the "sum" value as documented in the header of this document.

**Step 2.** Use the "dd" command to copy the file "CXXXXXXX.FRM" to tape, as follows: `dd if=CXXXXXXX.FRM of=/dev/rmt/0m bs=2k`  
(device path dependent)

NOTE: Blocksize (bs) must be = 2k

Identify Current Version of Firmware (on system to be updated)

**Step 1.** Re-boot your system and do the following:

- a. Interrupt the boot process and from the Boot Console Handler prompt, type <information> and press [return].
- b. Identify your firmware revision. The last two digits in the patch name indicate the revision. In this case, x.x is the revision. If the revision on your system is equal to or higher than x.x, do not proceed with the update.

### To install the firmware update

The following are the directions from the readme file that are the firmware updating instructions for a DAT tape drive:

**Step 1.** Install the tape you have just created into your tape drive.

**Step 2.** Shutdown your system via the power switch and power back on, or execute the reboot command resetting your system.

**Step 3.** When the display reads "Searching for a system to boot" press [escape]. At the BOOT ADMIN prompt, type search and press **Enter** or **Return** to identify the tape device path.

**Step 4.** Boot from the appropriate boot path. (You must boot from the device that contains the firmware update tape.) When the display reads "Interact with IPL (Y, N, Q)>", type N and press **Enter**.

---

**NOTE** This process is automatic and requires no interaction until directed to do so. Please do not interrupt the process. The load process will take about 2 minutes.

---

**Step 5.** A warning message will be issued, followed by "Continue ([y]/n)?" type **y** and press **Enter** if you wish to continue. Be sure the image on the tape is a newer version than that on your system before proceeding.

After several screens go by, you will be informed as to what firmware image is on your system and which image is on the tape. You will be asked if you want to proceed. "Continue ([y]/n)?"

If the image on the tape has a higher revision number, type **<y>** and press **Enter**. If no, then type **n** and press **Enter**.

---

**NOTE** FROM THIS POINT FORWARD, THIS PROCESS CANNOT BE INTERRUPTED UNTIL COMPLETION. INTERRUPTING THIS PROCESS WILL CAUSE YOUR SYSTEM TO BE INOPERATIVE.

DURING THE EXECUTION OF THIS UPDATE, THE FIRMWARE FONTS FILE WILL BE RE-WRITTEN. IF THESE ARE NEW FONTS, YOU WILL NOT SEE ANY TEXT WRITTEN TO THE SCREEN AFTER THE MESSAGE.

---

You will see 2 carriage returns and 2 line feeds and then the display will remain the same. In approximately 40 seconds the system will automatically re-boot. If it doesn't, the update has failed. Attempt to run the update again from Step 2. If it still fails, or you cannot get to the Boot Administration prompt, call your HP Service Representative.

The system will continue the normal boot process from the default primary path.

## Firmware Update Example

When you update the firmware, you will see the following information on the display.

launch IPL other

ISL Revision A.00.38 OCT 26, 1994

ISL booting ode fupdate; update pdc

```
*****
*****                                     *****
*****      Offline Diagnostic Environment      *****
*****                                     *****
***** (C) Copyright Hewlett-Packard Co 1993-1998 *****
*****      All Rights Reserved                *****
*****                                     *****
***** HP shall not be liable for any damages resulting from the *****
***** use of this program.                   *****
*****                                     *****
*****      TC Version A.02.14                 *****
*****      SysLib Version A.00.69             *****
*****      Loader Version A.00.47            *****
*****      Mapfile Version A.01.03           *****
*****                                     *****
*****
```

Type HELP for command information.

ISL\_CMD> fupdate; update pdc

```
*****
*****                                     *****
*****      FUPDATE                          *****
*****                                     *****
*****      Copyright (C) 1996-1998 by Hewlett-Packard Company *****
*****      All Rights Reserved              *****
*****                                     *****
***** HP shall not be liable for any damages resulting from the *****
***** use of this program.                 *****
*****                                     *****
*****      Version A.01.05                  *****
*****                                     *****
*****
```

Please wait while I map the system: Done.

Cannot get module's product string. Continuing

Please wait while I examine the LIF for F/W files: Done.

Type HELP for command information.

File Name	Intended Product	Version
PDC	Forte/Allegro Firmware (PDC)	1.1

```
*****
*      WARNING!      *
* Downloading incorrect F/W to a module can cause permanent *
* damage to the module or card you are downloading to.      *
* DO NOT INTERRUPT THIS PROCESS OR THE MODULE MAY BE DAMAGED!*
*****
F/W file Note:
```

## Boot Console Handler

### Obtaining and Updating System Firmware

Built Tue Mar 9 10:11:58 MST 1999 by fwbtr.

Continue ([y]/n)? y

```
*****
* CPU Firmware will now be downloaded. It should take no *
* more then 2 minutes. When the Firmware is successfully *
* downloaded the CPU will automatically reboot. However, if *
* The download failed and the system is hung, you will most *
* probably have to replace the Flash Memory chip manually. *
* Rebooting manually may work but most likely will not. *
*****
```

```
*****
* Firmware downloaded SUCCESSFULLY! *
*****
```

THIS UTILITY WILL NOW RESET THE SYSTEM...

---

## **A Product Specifications**

This appendix lists the regulatory specifications, safety requirements, environmental specifications, and electrical specifications for the HP VISUALIZE B Class and C Class workstations.

## **Regulatory and Safety Statements**

This section lists the regulatory and safety statements for the B1000 and the C3000 workstations.



## Declaration of Conformity

according to ISO/IEC Guide 22 and EN 45014

**Manufacturer:** Hewlett-Packard Company  
3404 East Harmony Road  
Fort Collins, CO 80528  
USA

**Declares, that the:**  
**Product Name:** HP VISUALIZE Workstation  
**Product Class:** B Class and C Class  
**Product Options:** all

### conforms to the following specifications:

Safety	IEC 950:1991+A1+A2+A3 +A4 / EN 60950:1992+A1+A2+A3+A4 +A11 IEC 60825-1:1993/EN60825-1:1994+A11 Class 1 for LED's USA 21CFR Subpart J - for FC Laser module China GB4943-1995 Russia GOST R 50377-92
EMC	CISPR 11: 1997 / EN 55011: 1998 Class B CISPR 22: 1993 + A1+A2 / EN 55022: 1994 +A1+A2 Class B EN 50082-1:1992 Also compliant with... IEC 1000-3-2:1994 / EN 61000-3-2:1998 IEC 1000-4-2:1995+A1 / EN 61000-4-2:1999 - 4 kV CD, 8 kV AD IEC 1000-4-3:1995 / EN 61000-4-3:1996 - 10 V/m IEC 1000-4-4:1995 / EN 61000-4-4:1995 - 2 kV Signal, 4 kV Power Lines US FCC Part 15, Class B Japan VCCI Class B Australia/New Zealand AS/NZS 2046.1/2:1992, AS/NZS 3548:1995, and AS/NZS 4251.1:1994 China GB9254-1988 Taiwan CNS13438 Class A Russia GOST R 29216-94

**and is certified by:**  
UL Listed to UL1950, 2nd edition, File E146385  
cUL Listed to CSA 22.2 No.950-M93  
TÜV Certified to EN60950 2nd edition with A1+A2+A3+A4+A11  
HP Fort Collins CCQD HTC

### supplementary information:

The product herewith complies with the requirements of the following Directives and carries the CE marking accordingly:

- the EMC directive 89/336/EEC and 92/31/EEC and 93/68/EEC
- the Low Voltage Directive 73/23/EEC and 93/68/EEC

This product was tested in a typical Hewlett Packard workstation configuration.

Original signed by Ruth Lutes, Site Quality Manager Fort Collins, CO, USA

### For Compliance Information ONLY, contact:

European Contact: Your local Hewlett-Packard Sales and Service Office or Hewlett-Packard GmbH, Department HQ-TRE  
Standards Europe, Herrenberger Straße 130, D-71034 Böblingen (FAX: +49-7031-14-3143)

Americas Contact: Hewlett-Packard, Fort Collins Site Quality Manager, mail stop 46, 3404 E. Harmony Rd., Ft. Collins, CO  
80528, USA

## Emissions Regulations

### Federal Communications Commission (FCC)

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules and Canadian Department of Communications. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communication. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception (determined by turning the equipment off and on), you can correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Ask the dealer or an experienced radio/television technician for help.

Hewlett-Packard's system certification tests were conducted with HP-supported peripheral devices and HP shielded cables, such as those you receive with your computer. Changes or modifications not expressly approved by Hewlett-Packard could void the user's authority to operate the equipment.

Operation of this device is subject to the following conditions:

- This device may not cause harmful interference.
- This device must accept interference received, including interference that may cause undesired operation.
- Cables used with this device must be properly shielded to comply with the requirements of the FCC.

## Special Video Configuration Statement

When a Video Out card has a cable connected to its video out connector, the HP Visualize B Class and C Class workstation no longer meets FCC Class B regulations. The workstation now becomes FCC Class A compliant. This statement applies only to those applications which include a cable connected to the video out connector on a Video Out card. No modification to the regulatory statements is necessary for applications which include cables connected to other connectors on the card, but not to the Video Out connector.

**Figure A-1. VCCI Class B ITE (Japan)**

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。  
取り扱い説明書に従って正しい取り扱いをして下さい。

**Figure A-2. RRL Class A EMI (Korea)**

사용시 안내문 (A급 기기)

이 기기는 업무용으로 전자파장애긴정을 받은  
기기이오니, 만약 잘못 구입하셨을 때에는 구입  
한 곳에서 비입무용으로 교환하시기 바랍니다.

**Figure A-3. EMI Class A (Taiwan)**

警告使用者：  
這是甲類的資訊產品，在居住的  
環境中使用時，可能會造成射頻  
干擾，在這種情況下，使用者會  
被要求採取某些適當的對策。

## Emissions Regulations Compliance

Any third-party I/O device installed in HP system(s) must be in accordance with the requirements set forth in the preceding Emissions Regulations statements: In the event that a third-party noncompliant I/O device is installed, the customer assumes all

responsibility and liability arising therefrom.

## Acoustics

Regulation On Noise Declaration For Machines -3. GSGV

Lpa <70dB	Lpa <70dB
operator position	am Arbeitsplatz
normal operation	normaler Betrieb
per ISO 7779	nach DIN 45635 T.19

## Laser Safety Statement (U.S.A.)

(For workstations that have a CD drive installed.)

The CD-ROM mass-storage system is certified as a Class 1 laser product under the U.S. Department of Health and Human Services (DHHS) Radiation Performance Standard according to the Radiation Control for Health and Safety Act of 1968.

This means that the mass-storage system does not produce hazardous laser radiation. Because laser light emitted inside the mass-storage system is completely confined within protective housings and external covers, the laser beam cannot escape from the machine during any phase of user operation.

## LEDs

The LEDs on this product are classified as “Class 1 LED PRODUCT” in accordance with EN 60825-1.

## Electrostatic Discharge (ESD) Precautions

Electrostatic charges can damage the integrated circuits on printed circuits boards. To prevent such damage from occurring, observe the following precautions during board unpacking and installation:

- Stand on a static-free mat.
- Wear a static strap to ensure that any accumulated electrostatic charge is discharged from your body to ground.
- Connect all equipment together, including the static-free mat, static strap, routing nodes, and peripheral units.
- Keep uninstalled printed circuit boards in their protective antistatic bags.
- Handle printed circuit boards by their edges, once you have removed them from their protective antistatic bags.

## Warnings

### **WARNING:**

Removing device cover may expose sharp edges in equipment chassis. To avoid injury, use care when installing customer add-on devices.

### **WARNUNG:**

Das Entfernen der Geräteabdeckung legt die scharfen Kanten im Inneren des Gerätes frei. Um Verletzungen zu vermeiden, seien Sie vorsichtig beim Einbau von zusätzlichen Bauteilen, die vom Kunden selber eingebaut werden können.

### **AVERTISSEMENT:**

Des bords tranchants du châssis de l'équipement peuvent être exposés quand le cache de l'unité n'est pas en place. Pour éviter des blessures, faire très attention lors de l'installation de modules supplémentaires par le client.

### **WARNING:**

Disconnect power plug from wall outlet or source power before moving or removing the device, or installing add-on components.

### **WARNUNG:**

Entfernen Sie die Stromzuführung von der Steckdose oder der Stromquelle bevor Sie das Gerät bewegen, abbauen, oder zusätzliche Bauteile installieren.

### **AVERTISSEMENT:**

Débrancher la fiche de la prise de courant ou de la source d'alimentation électrique avant de déplacer ou de retirer l'unité, ou avant d'installer des modules supplémentaires.

### **WARNING:**

Lithium batteries may explode if mistreated. Do not put lithium batteries in fires or try to recharge or disassemble them.

## **Environmental Specifications**

### **Acoustics**

Deskside: 4.7 bels typical @ 25° C  
4.9 bels typical @ 30° C

### **Altitude**

Operating: 0-10,000 ft. above sea level (0-3000m)  
Non-operating (storage or shipping): 0-15,000 ft. above sea level (0-4500m)

### **DC Magnetic Field Interference**

Operating: <1 Gauss at surface of product  
Non-operating: <2 mGauss @ 7 feet

### **Electromagnetic Compatibility (EMC)**

Emissions: FCC Class B, CISPR B  
Immunity: EN61000-4-2: 1995 - 4KV contact discharge, 8KV air discharge (ESD)  
EN61000-4-3: 1991 - 10V/m (radiated immunity)  
EN61000-4-4: 1995 - 2kV signal lines, 4kV power lines (EFT)

### **Temperature**

Operating: 5 to +40° C  
Non-operating (shipping or storage): -40 to +70° C

### **Humidity (Non-condensing)**

Operating: 15 to 80% RH  
Non-operating: 0 to 90% RH (storage or shipping)

### **Leakage Current**

Less than 3 milliamps

### **Shock**

Operating: 20g at 3ms, 1/2 sine in normal axis with no hard errors  
Non-operating (shipping): 80g at 3ms, 1/2 sine, normal axis

## **Vibration**

Operating random: 0.21 Grms, 5-500 Hz

Swept sine survival (shipping): 0.5 G (0-peak), 5-500 Hz

Random survival (shipping): 2.09 Grms, 5-500 Hz

## Electrical Specifications

### Input Power

For B Class and C Class workstations:

7.4 Amps RMS max @ 100V
6.2 Amps RMS max @ 120V
3.8 Amps RMS max @ 200V
3.2 Amps RMS max @ 230V

### Line Power

AC Frequency: 48-66 Hz
AC Voltage: 90-264V
Maximum Power Input: 805 Watts
Maximum Current Load: 10 Amps



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## **B SCSI Connections**

This appendix provides information about connecting Small Computer System Interface (SCSI) devices to an HP VISUALIZE B Class and C Class workstation.

The following topics are covered within this section:

- SCSI bus differences
- SCSI restrictions
- Determining SCSI bus length
- Assigning SCSI device IDs
- Connecting to the SCSI ports

The instructions in this chapter assume you are using HP-UX 10.20 operating system and Workstation Additional Core Enhancements for HP-UX 10.20 (June 1999) with HP CDE (Common Desktop Environment) or HP-UX 11.0 ACE 9911.

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<b>NOTE</b>	When attaching external SCSI devices, be sure to terminate the last device on the external SCSI bus. The terminators are shipped with the B Class and C Class workstations.
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## SCSI Bus Differences

A Small Computer Systems Interface (SCSI) bus is an IEEE standard bus for connecting your workstation to internal and external devices (SCSI devices) running at different speeds. There may be one device connected to the external SCSI port or more than one device may be daisy chained to a single external SCSI port. Examples of SCSI devices are 4-mm DDS-format tape drives and hard disk drives.

There are two types of SCSI buses available with this workstation—an Ultra Narrow Single-Ended SCSI bus (NSE SCSI), and an Ultra2 Wide Low-Voltage Differential SCSI bus (LVD SCSI). The following table shows the specification differences between these SCSI buses.

**CAUTION** Currently Hewlett-Packard does not support mixing Ultra Narrow Single-Ended and Ultra2 Wide LVD devices on any one bus type.

**Table B-1. SCSI Bus Differences**

Type	Transfer Rate	Data Bus Width	Available SCSI Addresses <sup>1</sup>	Maximum Cable Length	Device Physical Location <sup>2</sup>
Ultra Narrow Single-Ended	Up to 20 Mbytes/sec	8 bits	0 through 6	3.0 meters (9.84 feet)	External
Ultra2 Wide Low-Voltage Differential	Up to 80 Mbytes/sec	16 bits	0 through 6; 8 through 15	12 meters (39.37 feet)	Internal and external
<p>1. Address 7 is reserved for host controller use on all buses.</p> <p>2. This information is specific to the HP VISUALIZE B Class and C Class workstations.</p>					

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## SCSI Restrictions

This section describes the SCSI restrictions that apply to your workstation in the following areas:

- Cables
- Terminators
- Number of Devices Per SCSI Bus
- Considerations for Selecting SCSI Devices

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**NOTE**      The Ultra Narrow, single-ended SCSI bus supports only 7 devices because address 7 is reserved by the system. The Ultra2 Wide, Low-Voltage Differential SCSI bus supports 15 devices because address 7 is reserved by the system.

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### Cables

Only SCSI cables approved by HP can be used to connect your workstation and any SCSI devices. HP offers the following SCSI cables for Ultra Narrow single-ended SCSI devices:

**Table B-2. Ultra Narrow Single-Ended SCSI Cables**

Cable Number	Cable Length	Description
C2955A	0.5m	50-pin HDTS <sup>1</sup> to 50-pin HDTS
C2908A	1.0m	
C2956A	1.5m	
C2957A	2.0m	

1. High Density Thumb Screw (HDTS)

HP offers the following SCSI cables for connecting externally connected devices to the system Ultra2 Wide Low-Voltage Differential port:

**Table B-3. Ultra2 Wide Low-Voltage Differential SCSI Cables**

Cable Number	Cable Length	Description
C2978A	0.5m	68-pin HDTS <sup>1</sup> to 68-pin HDTS
C2979A	1.5m	
C2911B	1.0m	
C2924B	2.5m	
C2361A	1.0m	68-pin VHDCI <sup>2</sup> to 68-pin HDTS
C2362A	2.5m	
C2363A	10.0m	
C2365A	5.0m	

1. High Density Thumbscrew (HDTS)

2. Very High Density Cabled Interconnect (VHDCI)

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<b>CAUTION</b>	SCSI cables approved by HP are designed to function within the SCSI tolerances for HP devices. Use of other cables can result in significant problems with system operation.
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Always use the shortest possible cable(s) for your configuration.

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<b>NOTE</b>	See “Determining SCSI Bus Length” later in this Appendix to determine the total length of your cables.
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## Terminators

The terminators for Ultra2 Wide Low-Voltage Differential SCSI (LVD SCSI) and Ultra Narrow Single-Ended SCSI (NSE SCSI) are different. The NSE SCSI terminator has 50 pins and will fit on an NSE SCSI connector. The LVD SCSI terminator has 68 pins and will fit on a LVD SCSI connector. Note that these SCSI terminators were shipped with your system.

---

<b>CAUTION</b>	It is necessary to put a terminator on unused SCSI connectors on the back panel of the system. However, if SCSI devices are attached to the SCSI bus via these connectors, the external device connected to the SCSI bus must be terminated with a SCSI terminator. If you do not already have the SCSI terminators, you must order terminator A1658-63012 (for the 50-pin terminator; NSE SCSI) or A4986-63008 (for the 68-pin terminator; LVD SCSI) from Hewlett-Packard.
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## Number of Devices Per SCSI Bus

The number of SCSI devices per bus is limited (see Table B-1. on page 203). Before adding another SCSI device, determine if the system can support the additional device.

This workstation offers the following types of SCSI buses, each with their own configuration constraints:

- Ultra Narrow Single-Ended SCSI bus
- Ultra2 Wide Low-Voltage Differential SCSI bus

## Considerations for Selecting SCSI Devices

SCSI devices supported by the Hewlett-Packard Company for the Ultra Narrow Single-Ended (NSE) and Ultra2 Wide Low-Voltage Differential (LVD) SCSI buses have been qualified as SCSI devices which meet NSE and LVD specifications. Contact the local HP sales representative for a current list of SCSI devices supported by HP for use on the Ultra Narrow Single-Ended and Ultra2 Wide Low-Voltage Differential SCSI buses.

If devices other than those supported by HP are connected to the Ultra Narrow Single-Ended or the Ultra2 Wide Low-Voltage Differential SCSI bus on this system, they must adhere to cabling, termination and bus length restrictions discussed in this chapter to assure functionality of the SCSI busses.

Because Ultra2 Wide Low-Voltage Differential SCSI is a relatively new technology, there can be products which are advertised as LVD compliant, but may not meet LVD specifications. Therefore, additional caution must be exercised when choosing Ultra2 Wide Low-Voltage Differential SCSI bus on this system. For example, the cabling inside one of these devices in question may not have a differential impedance between 110 ohms and 135 ohms and it may be constructed in a way such that the device has considerable crosstalk on critical signals, such as Reset, Select and Busy. Failure to strictly adhere to the Ultra2 Wide Low-Voltage Differential SCSI bus specifications will impact the performance of the LVD bus. The Ultra2 Wide Low-Voltage Differential interface is a much

higher performance SCSI bus than previous SCSI buses and is more sensitive to adherence to the electrical specifications.

Low-voltage differential signaling specifications are described in the *SCSI Parallel Interface-2 (SPI-2)* document and in the *Electrical Characteristics of Low Voltage Differential Signaling (LVDS) Interface Circuits TIA/EIA-644* document. Both of these documents can be obtained from:

Global Engineering Documents

15 Inverness Way East

Englewood, CO 80112-5704

(800) 854-7179 or (303) 397-7956

## SCSI Bus Length Constraints

This section discusses SCSI bus length constraints for the Ultra Narrow Single-Ended SCSI bus and the Ultra2 Wide Low-Voltage Differential SCSI bus.

### Ultra Narrow Single-Ended SCSI Bus Length

The maximum cable length for a Ultra Narrow Single-Ended SCSI bus is 3 meters. The HP VISUALIZE B Class and C Class system uses a negligible amount of this maximum cable length.

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<b>NOTE</b>	When calculating the total Ultra Narrow Single-Ended SCSI cable/bus/trace length used externally, remember to account for cables connecting external devices together as well as the bus length internal to those devices.
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There are two total cable length specifications that apply to the Ultra Narrow Single-Ended SCSI bus on the workstation. Note that these specifications are based on the requirement that the SCSI device being connected to the NSE SCSI bus does not exceed the maximum capacitance of 25 picofarads (pF). Check with the vendor of the SCSI device for the maximum capacitance specification.

The total cable length specifications are described below:

- For a total of one to four devices being connected to the NSE SCSI bus the total length of cable used should not exceed 3.0 meters
- For a total of five to eight devices being connected to the NSE SCSI bus the total length of cable used should not exceed 1.5 meters.

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<b>NOTE</b>	Remember that the workstation is counted as one of the total device, and the internal length of its cabling is 0.15 meters. This length needs to be considered in your total cable length determination.
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### Ultra2 Wide Low-Voltage Differential SCSI Bus Length

The maximum cable length for a Ultra Wide Low-Voltage Differential SCSI bus is 12 meters. The HP VISUALIZE B Class and C Class system uses 1 meter of this maximum cable length internally. This means that up to 11 meters of cable can be used for connecting external Ultra2 Wide Low-Voltage Differential SCSI devices to this workstation.



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<b>NOTE</b>	When calculating the total Ultra2 Wide Low-Voltage Differential SCSI cable/bus/trace length used externally, remember to account for cables connecting external devices together as well as the bus length internal to those devices.
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## Assigning SCSI Device IDs

Before assigning a SCSI device ID to your drive, you need to check the existing SCSI device IDs. To determine which SCSI device IDs are available for your device, use the `ioscan` command in a terminal window:

1. At a command line prompt, enter the following:

```
/usr/sbin/ioscan -f
```

After a few moments, the `ioscan` utility lists all of the SCSI I/O devices it could find. The list appears similar to the following:

Class	I	H/W Path	Driver	S/W State	H/W Type	Description
=====						
bc	0		root	CLAIMED	BUS_NEXUS	
bc	1	10	ccio2	CLAIMED	BUS_NEXUS	I/O Adapter
ba	0	10/0	ROPetoPCI	CLAIMED	BUS_NEXUS	PCI Bus Bridge - ROPetoPCI
graphics	0	10/0/1/0	graph3	CLAIMED	INTERFACE	PCI(103c1005)
lan	0	10/0/12/0	btlan3	CLAIMED	INTERFACE	PCI(10110019)
audio	0	10/0/13/0	audio	CLAIMED	INTERFACE	PCI(11d41189)
ext_bus	0	10/0/14/0	side	CLAIMED	INTERFACE	PCI(100b0002)
target	0	10/0/14/0.0	tgt	CLAIMED	DEVICE	
disk	0	10/0/14/0.0.0	sdisk	CLAIMED	DEVICE	TEAC CD-532E-B
target	0	10/0/14/0.7	tgt	CLAIMED	DEVICE	
ctl	0	10/0/14/0.7.0	sctl	CLAIMED	DEVICE	Initiator
ba	1	10/0/14/1	superio	CLAIMED	BUS_NEXUS	PCI Core I/O Adapter
tty	0	10/0/14/1/1	asio0	CLAIMED	INTERFACE	Built-in RS-232C
tty	1	10/0/14/1/2	asio0	CLAIMED	INTERFACE	Built-in RS-232C
ext_bus	1	10/0/14/1/3	SCentIf	CLAIMED	INTERFACE	Built-in Parallel Interface
siopc	0	10/0/14/1/4	siofdc	CLAIMED	INTERFACE	Built-in Floppy Drive
floppy	0	10/0/14/1/4.1	sioflop	CLAIMED	DEVICE	HP_PC_FDC_FLOPPY
usb	0	10/0/14/2	hcd	CLAIMED	INTERFACE	Built-in USB Interface
usbhub	0	10/0/14/2.1	hub	CLAIMED	DEVICE	USB Root Hub
ext_bus	2	10/0/15/0	c720	CLAIMED	INTERFACE	Ultra Narrow Single-Ended SCSI
target	1	10/0/15/0.7	tgt	CLAIMED	DEVICE	
ctl	1	10/0/15/0.7.0	sctl	CLAIMED	DEVICE	Initiator
ext_bus	3	10/0/15/1	c720	CLAIMED	INTERFACE	Ultra2 Wide LVD SCSI
target	2	10/0/15/1.6	tgt	CLAIMED	DEVICE	
disk	0	10/0/15/1.6.0	sdisk	CLAIMED	DEVICE	SEAGATE ST39102LC
target	3	10/0/15/1.7	tgt	CLAIMED	DEVICE	
ctl	2	10/0/15/1.7.0	sctl	CLAIMED	DEVICE	Initiator
ba	2	10/1	ROPetoPCI	CLAIMED	BUS_NEXUS	PCI Bus Bridge - ROPetoPCI
ba	3	10/2	ROPetoPCI	CLAIMED	BUS_NEXUS	PCI Bus Bridge - ROPetoPCI
ba	4	10/4	ROPetoPCI	CLAIMED	BUS_NEXUS	PCI Bus Bridge - ROPetoPCI
ba	5	10/6	ROPetoPCI	CLAIMED	BUS_NEXUS	PCI Bus Bridge - ROPetoPCI
processor	0	32	processor	CLAIMED	PROCESSOR	Processor
processor	1	34	processor	CLAIMED	PROCESSOR	Processor
memory	0	49	memory	CLAIMED	MEMORY	Memory

## Assigning Ultra Narrow Single-Ended SCSI Device IDs

You can determine which Ultra Narrow Single-Ended SCSI (NSE SCSI) devices are currently in use by reviewing the output from the `ioscan` command discussed above and looking under the “H/W Path” heading. The entry `10/0/15/0` is the built-in Ultra Narrow Single-Ended SCSI bus. For devices connected to the built-in Ultra Narrow Single-Ended SCSI bus, such as disks, the number between the two decimals and after the third “/” in the hardware path specifies the SCSI ID for that device. For example, a hardware path of `10/0/15/0.2.0` specifies a NSE SCSI device at SCSI ID 2.

Here is the break down of the hardware path:

SCSI device	<b>10/0/15/0.2.0</b>
NSE SCSI	10/0/15/ <b>0</b> .2.0
SCSI ID 2	10/0/15/0. <b>2</b> .0

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<b>CAUTION</b>	Do not use SCSI device ID 7 for any device. It is reserved for the built-in SCSI bus controller.
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## Assigning Ultra2 Wide Low-Voltage Differential SCSI Device IDs

You can determine which Ultra2 Wide Low-Voltage Differential SCSI (LVD SCSI) devices are currently in use by reviewing the output from the `ioscan` command discussed above and looking under the “H/W Path” heading. The entry `10/0/15/1` is the built-in Ultra2 Wide Low-Voltage Differential SCSI bus. For devices connected to the built-in Ultra2 Wide Low-Voltage Differential SCSI bus, such as disks, the number between the two decimals and after the third “/” in the hardware path specifies the SCSI ID for that device. For example, a hardware path of `10/0/15/1.5.0` specifies a LVD SCSI device at SCSI ID 5. Here is the break down of the hardware path:

SCSI device	<b>10/0/15/1.5.0</b>
LVD SCSI	10/0/15/ <b>1</b> .5.0
SCSI ID 5	10/0/15/1. <b>5</b> .0

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<b>CAUTION</b>	Do not use SCSI device ID 7 for any device. It is reserved for the built-in SCSI bus controller.
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## Connecting to the SCSI Ports

This section describes how to connect to the system SCSI ports (Ultra Narrow Single-Ended and Ultra2 Wide Low-Voltage Differential).

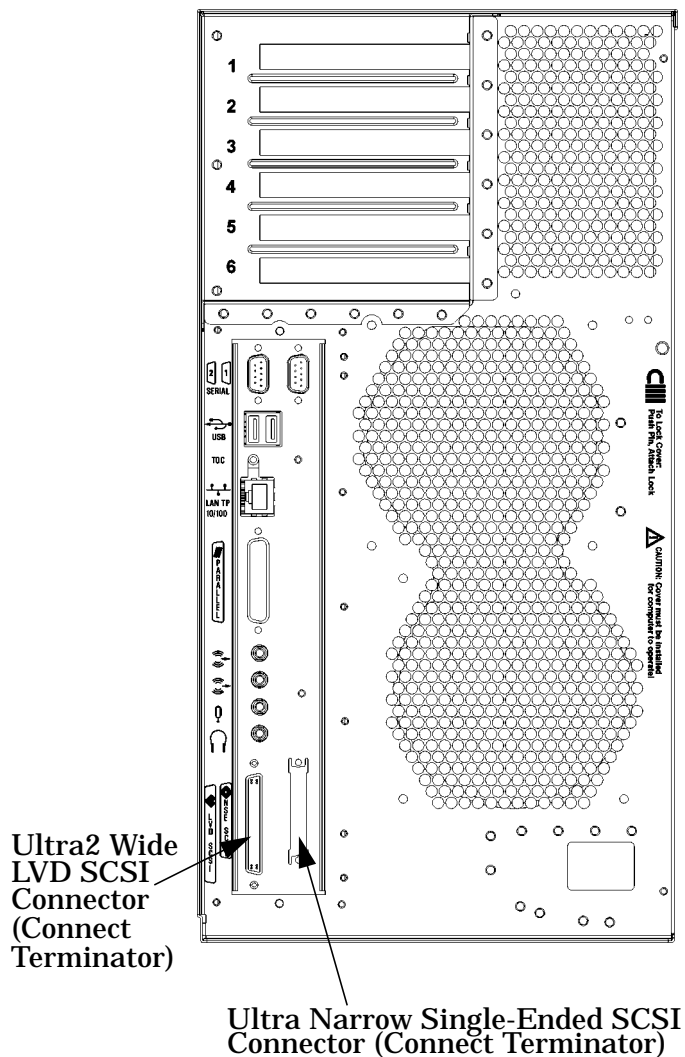
### System SCSI Port Connection

The system contains two SCSI connectors:

- Ultra Narrow, Single-Ended SCSI (NSE SCSI) connector
- Ultra2 Wide Low-Voltage Differential SCSI (LVD SCSI) connector

Figure B-1 shows the two SCSI connectors. SCSI cables connect to these ports with a high-density thumbscrew connector.

**Figure B-1. SCSI Ports**



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<b>NOTE</b>	It is necessary to put a terminator on unused SCSI connectors on the rear panel, or the last device connected to the SCSI bus. Terminators are shipped with the system. Only use a NSE SCSI terminator for the NSE SCSI bus and a FW LVD terminator for the FW LVD SCSI bus.
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## **C Related Documentation**

This appendix provides part numbers and titles to related documentation.

## **Installation Manual**

- A4985-90010 - *HP VISUALIZE B Class and C Class Installation Card*

## **Service Manuals**

- A4985-90039 - *Service Handbook , HP VISUALIZE Workstations, Model B Class and C Class (this handbook)*
- B2355-90040 - *System Administration Tasks Manual HP 9000 Series 700*
- B3782-90176 - *Support Media User's Manual*
- A4033-90099 - *HP A4032/A4033 Color Monitors CE Handbook*

## **Reference Manuals**

- A4985-90013 - *HP VISUALIZE B Class and C Class Owner's Guide*



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# Glossary

## A

**absolute pathname** The full pathname of a file, including all the directories leading to it, starting with the root directory ("/") and ending with the filename itself *See also file, filename, pathname.*

**access permissions** Settings that allow (or prevents) a user or group of users to read, write, or execute files *See also file access permissions.*

**active window** The window that is receiving input from the keyboard at the present time. If there is no active window, anything you type is lost. Only one window can be the active window.

**ANSI** The American National Standards Institute, a non-profit organization, made up of various expert committees, that publishes standards for use by national industries. ANSI has adopted the IEEE standards for local area networks.

**argument** A part of a command line or line of source code that identifies the file, directory, or other data to be used; a parameter.

**attachment unit interface (AUI)** A transceiver cable that conforms to IEEE 802.3 specifications.

## B

**back up** v. To make a copy of one or more files on a tape or disk that can be stored separately from the original files.

**backup** n. A spare copy of one or more files on a tape or disk that can be used to restore data into its original location.

**bitmap** Generally speaking, an array of data bits that define a graphical image. Strictly speaking, a bitmap is a pixmap whose depth is one bit, capable of representing two-color (black-and-white) images.

**boot** Short for "bootstrap," from the phrase "pulling oneself up by one's bootstraps." Indicates the beginning of a process from the lowest possible level. A boot service is provided by a short program, stored in the boot ROM (read-only memory) of your workstation, that loads the operating system (or any complex program) into main memory. Partner workstations provide bootstrap service to

diskless workstations. See also boot ROM.

**boot console handler** The interactive firmware that enables you to interact with the hardware of your workstation before the workstation boots the operating system. The boot console interface allows you to perform special tasks, display information, and set certain system parameters.

**boot ROM** A read-only memory that is incorporated into a workstation for the purpose of loading and starting the operating system, and modifying the configuration or changing the booting behavior.

**bootstrap service** *See boot.*

**byte** A fundamental character-code unit, usually consisting of 8 bits.

## C

**CD-RAM** Compact Disk Random-Access Memory. *See also CD-RAM disk, CD-RAM drive.*

**CD-RAM disk** CD-RAM disks are identical to the audio compact disks (CDs) used to record stereo music, except computer data is

read from and written to these disks. CD-RAM disks are 120 mm (4.7 inches) in diameter, use one data surface, and have a capacity of about 650 MB. The data surface contains pits and flat spots arranged in a continuous spiral track, which is read at a constant linear speed.

**CD-RAM drive** A random-access, read/write, mass-storage device that uses removable CD-RAM disks. The drive contains a semiconductor laser for reading and writing data optically and an embedded controller.

**CD-ROM** Compact Disk Read-Only Memory. *See also CD-ROM disk, CD-ROM drive.*

**CD-ROM disk** CD-ROM disks are identical to the audio compact disks (CDs) used to record stereo music, except that they store computer data. CD-ROM disks are 120 mm (4.7 inches) in diameter, use one data surface, and have a capacity of about 650 MB. The data surface contains pits and flat spots arranged in a continuous spiral track, which is read at a constant linear speed.

**CD-ROM drive** A random-access, read-only, mass-storage device that

uses removable CD-ROM disks. The drive contains a semiconductor laser for reading data optically and an embedded controller.

### **Central Processing Unit (CPU)**

The part of a workstation that interprets and executes instructions; the “brain.”

**child directory** *See subdirectory.*

**click** To press and immediately release a mouse button. The term comes from the fact that pressing and releasing most mouse buttons makes a clicking sound. Compare drag and drop.

**cluster** A group of workstations connected via a Local Area Network (LAN). One workstation, the cluster server, acts as a file-system server for the cluster clients. *See also cluster client, cluster node, cluster server.*

**cluster client.** A cluster node that does not have a local HP-UX file system. Its file system resides on the cluster server. *See also cluster, cluster node, cluster server.*

**cluster node** A member of a

group of workstations connected via a Local Area Network (LAN). One workstation, the cluster server, acts as a file server to the other machines in the cluster. *See also cluster, cluster client, cluster server.*

**cluster server** A workstation that provides file access, login access, file transfer, printing, and other services across a network to a defined cluster of systems (cluster nodes) connected via a LAN. *See also cluster, cluster client, cluster node, host.*

**cold install.** A process that requires the booting of an install kernel from an install server over a network or from a CD-ROM and answering some configuration questions.

**command.** An instruction that you enter into the system at a prompt, to execute a program or perform a task. *See also shell command.*

### **command argument**

Information you provide on a command line to describe the object (often a file or directory) to be operated on by the command.

**command interpreter** A program that reads lines of text from standard input (typed at the keyboard or read from a file) and interprets them as requests to execute commands or programs. An HP-UX command interpreter is called a shell. *See also shell.*

**command option** Information you provide on a command line to indicate any special action you want the command to take, or mode in which to operate. *See also default.*

**configuration** The arrangement of a workstation or network as defined by the nature, number, and chief characteristics of its functional units. More specifically, the term “configuration” may refer to a hardware configuration or a software configuration.

**console.** The tty (terminal) the system was booted from. The console is associated with the monitor where all system messages are displayed. The system administrator sends messages to other system users from this tty.

**control key sequence** A keystroke combination used as a shorthand way of specifying

commands. To enter a control key sequence, hold down the “Ctrl” key while pressing another key.

**cpu** *See Central Processing Unit.*

**current directory** *See current working directory.*

**current session** The work and processes that have been created since you logged into the system (and before you log out again).

*See also session.*

**current working directory** The directory from which a relative-pathname search begins, as well as the directory in which you are currently working. It is also called the “working directory” or “current directory.”

**cursor** The small, usually blinking, box or underline displayed in whatever screen or window is active at any particular time. The cursor marks your current typing position on the screen and indicates which program (HP CDE terminal window or shell) will receive your typed commands.

## D

**daisy-chaining** A method of connecting devices in which the signal passes from one device to the next in serial fashion along a bus.

**DDS tape drive** A device that stores data on Digital Data Storage (DDS) cassettes.

**default** Most commands give you a choice of one or more options. If you don't specify an option, the command automatically assigns one. This automatic option is called the "default." *See also command option.*

**dialog box** A special type of HP CDE screen that contains controls and settings, and with which the user can carry on an interactive "dialog" in the process of setting whatever parameters the dialog box requests. To display an example of a dialog box, click the Style Manager button on the Workspace Manager's front panel, then click on Color.

**DIMM** *See Dual In-line Memory Module.*

**Dual In-line Memory Module** A memory board whose connectors on each side of the board are connected to different chips. This

allows for a wider data path as more modules can be accessed at the same time.

**directory** A special type of "container" object that contains information about the objects beneath it in the HP-UX organizational structure. Basically, it is a file that stores names and links to files and other directories *See also file.*

**disk** A thin, round plate with a magnetic or optical surface coating on which data is stored by magnetic or optical means. See also floppy diskette, hard disk, CD-ROM disk.

**disked workstation** A workstation that has its own hard disk drive.

**diskette** *See floppy diskette.*

**double click** To press and release a mouse button twice in rapid succession. The amount of time that discriminates between a double click and two single clicks is usually user-configurable. Double clicking usually invokes a different, but related, function than single clicking.

**drag** To move the mouse (and

hence the pointer on the screen) while holding down one or more of its buttons. This process specifies two separate locations on the screen for those operations that require two: the location when the mouse button is pressed, and the location when it is released. This is used, for example, to initiate a file-copy by pressing the mouse button on the file to be copied, dragging the file's icon to the destination window, and releasing the mouse button there. Another common using of dragging is to specify the upper-left and lower-right corners of a new window or similar rectangle *See also drop*.

**drive** *See CD-ROM drive, DDS tape drive, floppy drive, hard disk drive*

**drop** To release the mouse button after having moved the mouse with its button held down, in order to position an icon or other object that has been "dragged" to a new position *See also drag*.

## E

**EEPROM.** Electronically erasable read-only memory. Usually bytes or words can be erased and reprogrammed individually during

system operations. The EEPROM is used for storing configuration information that will be "remembered" after a reboot and AC power loss.

**environment** The conditions in which your commands or programs are executed. These conditions include your workstation characteristics, home directory, and default search paths *See also environment variables*.

**environment variables** The set of defined shell variables (some of which are PATH, TERM, SHELL, EXINIT, and HOME) that define the conditions in which, or values with which, your commands are executed. These conditions and values include your workstation characteristics, home directory, and default search paths *See also environment*.

**Ethernet** The LAN developed jointly by Digital Equipment Corporation, Intel, and Xerox Corporation, upon which the IEEE 802.3 network is based.

## F

**Fast Narrow Single-Ended SCSI** An 8-bit-wide SCSI bus with standard receivers and drivers

that runs at 20 Mbytes/second, which allows a cable length of up to 3 meters and a transfer rate of up to 20MB per second *See also Ultra2 Wide Low-Voltage Differential SCSI, Small Computer System Interface.*

**file** The basic named unit of data stored on disk *See also directory, filename.*

**file access permissions** The access rights given to a particular file or directory. Every file and directory has a set of access permissions, a code that determines whether a process can perform a requested operation on the file (such as opening the file or writing to it) *See also access permissions.*

**File Manager** The HP CDE application that allows you to manage your files and directories, and to set viewing preferences.

**filename** The name given to a particular file *See also absolute pathname, file, pathname.*

**file server** A workstation whose primary task is to control the storage and retrieval of data from hard disks. Any number of other workstations can be linked to the

file server via a LAN in order to use the file server to access data.

**file system** The hierarchically organized set of files and directories on a hard disk.

**firmware** The control software that is embedded in ROM and is always resident regardless of the status of the operating system. It handles the booting of the system, initialization of I/O, and starts the loading of the operating system.

**floppy diskette** A thin, flexible, disk-shaped sheet of plastic that magnetically stores data on its coated surfaces. Floppies are contained within stiff plastic “envelopes” to protect them from dust, fingerprints, and abrasion. The floppy drive uses heads (similar to heads in tape recorders) to read and write data on concentric disk tracks.

**floppy drive** A device that stores data on a floppy diskette.

## H

**hard disk** A type of disk that is rigid—often aluminum—as opposed to a thin plastic diskette, which is flexible.

**hard disk drive** A device that stores data on a hard disk. The hard disk can be a permanent part of the drive and thus be unremovable, or it can be removable. If it is removable, it is contained in a protective cover that is opened by the drive when access is needed.

**Help Manager** The HP CDE application that provides online help.

**\$HOME** The environment variable that contains the name of a user's home directory. This is the directory in which you are placed upon logging in. Typically, this is /home/login, where login is your username. *See also home directory.*

**home directory** A shorthand way of referring to a frequently used directory, almost always the login directory.

**host** A computer that offers one or more services; may be local or remote (accessible via a network) *See also cluster server.*

**host name** *See internet protocol address.*

**HP CDE** *See HP Common*

*Desktop Environment.*

**HP Common Desktop Environment** A user interface that draws a graphical layer over the complexities of the other layers of the system (the hardware, operating system, and X Window system), enabling you to control your workstation by directly manipulating graphical objects instead of by typing commands at a command-line prompt.

**HP-UX.** This is Hewlett-Packard's version of the UNIX® operating system.

**HP-UX cluster** *See cluster node, cluster server.*

## I

**icon** A small, graphic representation of an object. Objects can be "iconized" (turned into icons) to clear a cluttered workspace. Icons can be restored to their original appearance when needed. Whatever processes are executing in an object continue to execute when the object is iconized.

**iconify** *See iconize.*

**iconize** To turn a window or shell



into an icon *See also icon.*

**Initial System Loader** The program that actually controls the loading of the operating system.

**input device** Any of several pieces of hardware equipment used to give information to a system. Examples include the keyboard and the mouse *See also output device.*

**input window** The window that displays a program's prompt and any commands typed but not yet executed.

**Instant Ignition.** When the user's computer is turned on and it automatically boots up and is ready for use. Instant Ignition is the result of the computer's operating system being preloaded at the factory.

**install server.** This is a networked computer from which file sets and operating systems can be installed.

**internet protocol address (IP address)** A string of characters, in the format nnn.nnn.nnn.nnn, that uniquely identifies a workstation in a network. The nnn in the format specifier above is a one- to

three-digit decimal integer between 0 and 255, inclusive, in which leading zeroes are optional. The internet protocol address is also referred to as the "IP address."

**invisible filename** A filename in which the first character is a period (.). Invisible filenames are not displayed by the listing commands such as ls and ll without additional options, such as -a.

**IP address** *See internet protocol address.*

**ISL** *See Initial System Loader.*

## K-L

**kernel** The part of the operating system that is an executable piece of code responsible for managing the computer's resources. The kernel controls the rest of the operating system.

**LAN** *See local area network.*

**LAN station address** *See local area network station address.*

**link n.** A special object that contains the name of another object. When you specify a link as a pathname or part of a pathname,

the system substitutes the pathname that the link contains.

**link, v.** To establish a relationship between two objects such that one of the objects contains only the information required to associate it with the other, “real,” object.

**local area network (LAN)** A data communications system that allows a number of independent devices to communicate with each other. The systems and clusters that share data, hardware, and software resources via Networking Services software.

**local area network system address** The label that uniquely identifies the local area network (LAN) connection for your workstation at the hardware level. This 48-bit number is preassigned by HP on their computers and it must never be changed.

**log in v.** To initially sign on to the system so that you may begin to use it. This creates your first user process. *See also* username.

**login n.** A session. Or, a string of characters that uniquely identifies a user of the system *See also session, user account, and username.*

**login directory** The directory in which you are placed when you log in, usually your home directory

*See also home directory.*

**Login Manager** The program that controls the initial startup of HP CDE and accepts the user's username and password

**login script** The shell program that runs at each login, and sets the login environment for your system.

## M

**menu bar** An area at the top or bottom of a window that contain the titles of the pull-down or pop-up menus for that application.

**minimize button** In HP CDE, a push-button on the window frame that turns a screen into an icon. *See also icon, iconize.*

**monitor type.** A monitor path name (graphics(1) through graphics(6)) that is associated with a particular resolution and refresh frequency at which you want your monitor to operate. The monitor type is selected using the Boot Console Interface. *See* Chapter 6.

**mouse pointer** *See pointer.*

## N

**name** A character string associated with a file, directory, or link. A name can include various alphanumeric characters, but never a slash (/) or null character

*See also pathname.*

**network** Two or more workstations sharing information *See also cluster, workstation.*

**network controller** A printed circuit board that passes bit streams between the network and the main memory of the workstation. Coupled with the network transceiver, the controller also handles signal processing, encoding, and network media access.

**node** A computer that is on a network. Each node in the network can use the data, programs, and devices of other network nodes, assuming permissions are set up properly. Each node contains main memory and has its own disk or shares one with another node

*See also disked workstation, diskless workstation, workstation.*

**node name** A unique identifying name given to a workstation in a cluster *See also cluster, node.*

**nonvolatile memory** System memory that retains its contents even after workstation power is turned off.

## O

**object** Any file, directory, or link in the network. *See also directory, file, link, pathname.*

**operating system** The program that supervises the execution of other programs on your workstation. For example, the entire HP-UX system, including the kernel and all HP-UX commands *See also kernel.*

**option** *See command option.*

**output device** Any of several pieces of hardware used for receiving messages from the computer and storing them, or making them perceptible by humans. Disks and tapes, computer monitors, printers, plotters are examples of output devices *See also input device.*

**output window** The window that displays a process response to your

command.

### P

**parent directory** A directory that contains other directories, each of which is then called a subdirectory *See also subdirectory.*

**password** The secret word you enter next to the password prompt at login time to permit only authorized access. Keep your password secret and change it occasionally in order to protect your account from unauthorized use *See also user account.*

**path** The hardware address of a device that is attached to the I/O system of your workstation.

**pathname** A slash/separated series of zero or more directory names followed by a filename, that together describe the path within the file system from some starting point to a destination object. Pathnames (other than the degenerate empty case) begin with the name of the starting point, and include every directory name between the starting point and the destination object. A pathname ends with the name of the destination object *See also name,*

*object.*

**permissions** A set of rights (read, write, execute) associated with an object in the file system. Determines who may use the object and how.

**PID** Process Identifier. Also referred to as a process ID *See also process ID.*

**PIM.** Processor Internal Memory. The pim command is a command used by the Boot Console Interface for determining specific system faults. *See also processor internal memory.*

**pointer** Sometimes called the “mouse pointer,” the pointer’s location on the display corresponds to the mouse’s location. The pointer’s shape often depends on the object its hot-spot covers (this is used as a visual feedback mechanism from a program to the user). In the HP CDE Workspace, the default pointer is an X; on a window frame, it is either a simple arrow, or an arrow with one or more straight lines touching it (to indicate any of the eight window-resizing regions).

**process** A computing environment in which you may

execute programs; a program currently running in the system.

**process ID** A unique identification number assigned to all processes by the operating system. Also referred to as a PID  
*See also PID.*

**processor internal memory.** A storage area in a processor (for example, EEPROM) that is set at the time of a high-priority machine check (HPMC), low-priority machine check, soft boot or TOC, and is composed of the architected state save error parameters, and hardware version-dependent regions.

**program.** A unit of executable code, in source-code or binary form. Most HP-UX commands and routines consist of programs.

**prompt** A message or symbol displayed by the system to let you know that it is ready for your input.

**push button** A graphic control that simulates a real-life push button. Use the pointer and mouse to push the button and start an action or set a state.

## R-S

**RAM** Random-access memory.

**ROM** Read-only memory.

**root** *See superuser.*

**scroll bar** A vertical or horizontal bar located on the side or bottom of a window that allows the user to view information that does not fit within the window.

**SCSI** *See Small Computer System Interface.*

**SCSI ID.** The address of a peripheral device connected to a SCSI bus.

**server** A program that controls all access to input and output devices.

**session** The time between when you log in and when you log out. Also called a “work session” or a “login session.” *See also current session.*

**shell** A command-line interpreter program used to invoke programs. Some examples of HP-UX shells are the Bourne, Korn, Key, and C shells. Sometimes referred to as a “command interpreter.” *See also command interpreter.*

**shell command** An instruction you give the system to execute a utility program or shell script

*See also shell script, utility program.*

**shell script** A file that contains commands that the system can interpret and run in a shell.

**shutdown** The process of taking the system from multi-user state to system administration state.

**slider** One of the components of a scroll bar. The slider is the object that is dragged along the scroll area to cause the window's contents to move, exposing previously hidden content.

**Small Computer System Interface (SCSI)** An IEEE standard for interfacing a computer to multiple, disparate high-speed peripherals such as a disk drive, a CD-ROM drive, or a scanner, etc., singly or in combination *See also Ultra2 Wide Low-Voltage Differential SCSI, Fast Narrow Single-Ended SCSI.*

**SPA.** Soft Physical Address. *See also soft physical address.*

**soft physical address.** This is a location in system memory associated with the DIMM cards.

**standalone** A workstation that is not part of a cluster *See also cluster.*

**Style Manager** The HP CDE application that provides the ability to customize various user-interface aspects of your system, including colors, fonts, keyboard and mouse attributes, session start-up and termination behavior, and access to other workstations.

**subdirectory** A directory that is located in, or anywhere on a path below, another directory. The directory above the subdirectory is called the "parent directory." A subdirectory is also referred to as a "child directory" *See also parent directory.*

**superuser** A user with permission to enter any directory and make changes to files and programs that typical users are not allowed to change. To "become superuser" or "become root" means to let the system know that you are now assuming the role of system administrator. You can do this either by logging into the system

as user root, or by typing su (switch user) at a command-line prompt. You must know the root password to become root.

**system administrator** The person responsible for system and network installation, updating, maintenance, and security at your site.

**system call** Invocation of a kernel process by a user program.

**system name** *See internet protocol address.*

## T-U

**terminal window** A terminal window is a type of HP CDE window that emulates a complete display terminal. Terminal windows are typically used to fool window-dumb programs into believing they are running in their favorite terminal. When not running programs or executing operating system commands, terminal windows display the command-line prompt *See also HP Common Desktop Environment.*

**title bar** The rectangular area, between the top of the window and

the window frame, that contains the title of the window object.

**TOC.** *See transfer of control.*

**transceiver** A device that transmits and receives signals.

**transfer of control.** Saves the state of the processor in Processor Internal Memory (PIM) and pending I/O operations are not disturbed.

**Ultra2 Wide Low-Voltage Differential SCSI** A 16-bit-wide bus with low-power receivers and drivers, which allows a cable length of up to 12 meters and a data transfer rate of up to 80 MB per second *See also Fast Narrow Single-Ended SCSI, Small Computer System Interface.*

**user account** The system administrator defines a user account for every person authorized to use the system. Each user account contains the name the computer uses to identify the person (user ID), and the person's password. User accounts also contain project and organization names, to help the system determine who can use the system and what resources each person or

organization is authorized use

*See also user ID, password.*

**user ID** The name the computer uses to identify you. Your system administrator assigns you a user ID. Enter your user ID during the login procedure when the system displays the login prompt *See also user account.*

**username** The name that the system recognizes as uniquely yours. Also known as your “login name.” The username is also the name that identifies you to the mail system and other software requiring secure entry.

**utility** *See utility program.*

**utility program** A program provided with the operating system to perform a frequently required task, such as printing a file or displaying the contents of a directory *See also command, shell command.*

## W

**window** A rectangular area of the screen for viewing information. HP CDE allows you to create several types of windows on the screen. Each window is a separate

computing environment in which you may execute programs, edit text, display graphical images, etc *See also Workspace Manager.*

**Window Manager** The HP CDE program that controls the size, placement, and operation of windows.

**working directory** *See current working directory.*

**Workspace** What the screen becomes when you start HP CDE. Although you can hide the workspace under terminal windows or other graphic objects, you can never position anything behind the workspace. All windows and graphic objects appear stacked “on top of” the workspace *See also HP Common Desktop Environment, terminal window.*

**Workspace Manager** The program that controls the size, placement, and operation of windows on the HP CDE Workspace. The Workspace Manager is a special Window Manager *See also Window Manager.*

**workstation** A compact, graphics-oriented computer having high speed and high memory



capacity. A workstation usually includes a keyboard, a monitor, and a system unit *See also node, disked workstation, diskless workstation.*



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